



**UNIVERSITI KUALA LUMPUR  
Malaysia France Institute**

---

**FINAL EXAMINATION  
SEPTEMBER 2013 SESSION**

---

**SUBJECT CODE** : FVB 21503  
**SUBJECT TITLE** : ENGINEERING SCIENCE 2  
**LEVEL** : BACHELOR  
**TIME / DURATION** : 3 HOURS  
**DATE** :

---

**INSTRUCTIONS TO CANDIDATES**

---

1. This is an OPEN BOOK examination.
  2. Please read the instructions given in the question paper CAREFULLY.
  3. This question paper is printed on both sides of the paper.
  4. Please write your answers in the answer booklet provided.
  5. Answer should be written in blue or black ink except for sketching, graphic and illustration.
  6. This question paper consists of SIX (6) questions. Answer FIVE (5) questions only.
- 

**THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

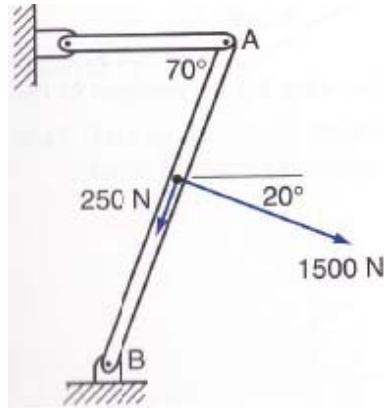
---

**INSTRUCTION: Answer FIVE (5) questions only.**

**Total Marks = 100**

**Question 1**

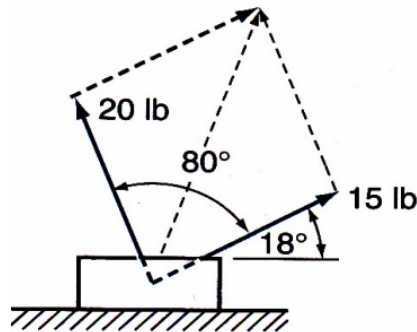
- (a) Member AB of the frame shown in **Figure 1** has two forces acting on it. Find the resultant force of the frame.



**Figure 1**

(5 marks)

- (b) Using the cosine law, solve for the resultant of the forces shown in **Figure 2**.

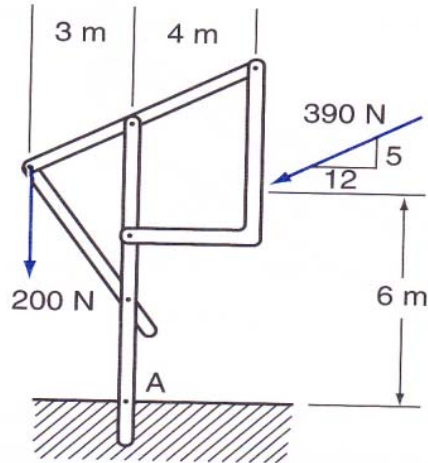


**Figure 2**

(15 marks)

**Question 2**

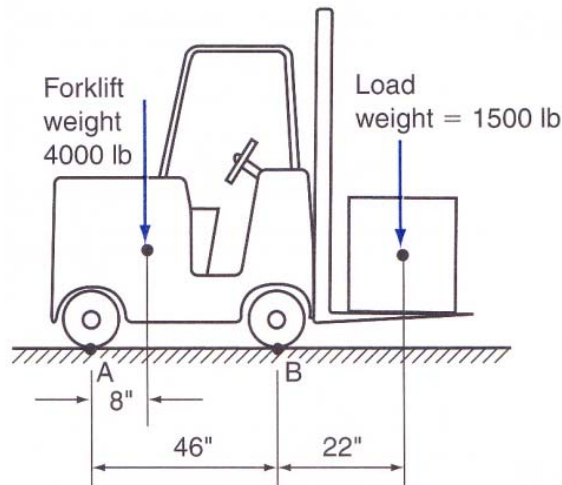
(a) Calculate the moment about point A in **Figure 3**.



**Figure 3**

(5 marks)

(b) For the forklift truck shown in **Figure 4**, determine (a) the moment about A due to the two weights shown and (b) the moment about B due to the two weights shown.

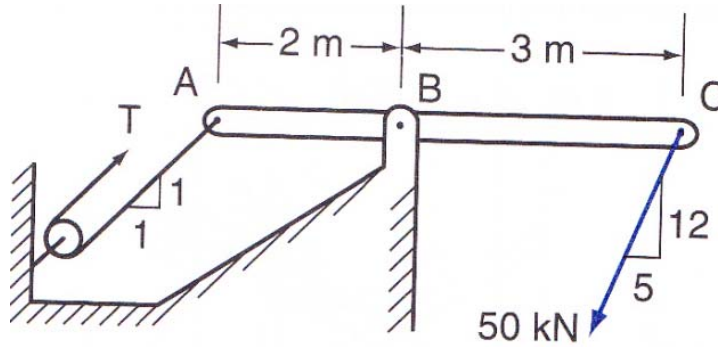


**Figure 4**

(15 marks)

**Question 3**

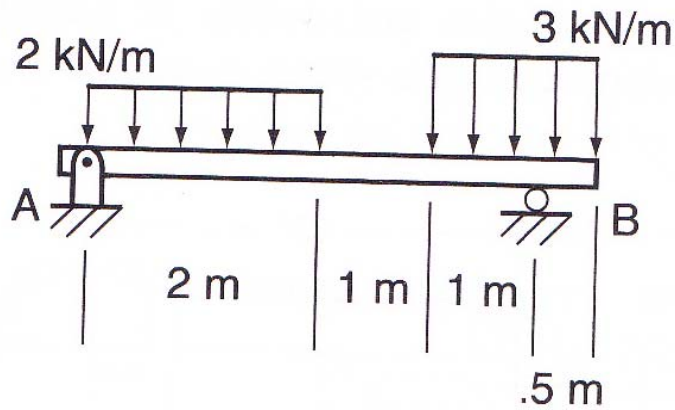
- (a) Draw a free-body diagram of member AC in **Figure 5**.



**Figure 5**

(5 marks)

- (b) Determine the reactions at A and B for the beams loaded as shown in **Figure 6**.

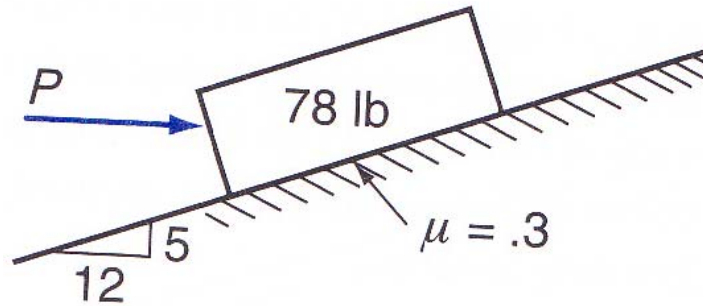


**Figure 6**

(15 marks)

**Question 4**

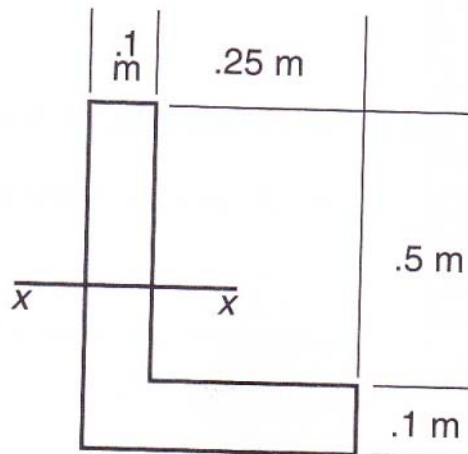
- (a) Determine the force  $P$  for impending motion up the plane shown in **Figure 7**.



**Figure 7**

(5 marks)

- (b) Determine the moment of inertia about the centroidal  $x$ -axis of the areas shown in **Figure 8**.



**Figure 8**

(15 marks)

**Question 5**

- (a) The wheel on a boat trailer has an angular speed of 1400 rpm when the trailer is towed at 90 km/h. Calculate the angular deceleration if the trailer decelerates uniformly to 40 km/h in 1.2 minutes.

(5 marks)

- (b) A train with a maximum speed of 105 km/h has an acceleration rate of  $0.25 \text{ m/s}^2$  and a deceleration rate of  $0.7 \text{ m/s}^2$ . Determine the minimum running time between stations 7 km apart, if it stops at all stations.

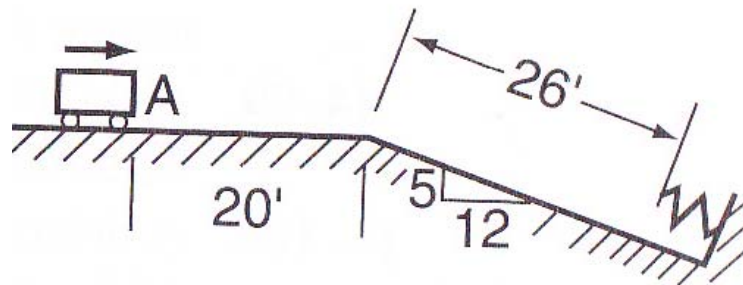
(15 marks)

**Question 6**

- (a) A body slides down a plane inclined at  $40^\circ$  to the horizontal, with an acceleration of  $2.3 \text{ m/s}^2$ . Determine the coefficient of kinetic friction.

(5 marks)

- (b) Cart A, weighing 390lbs, has an initial velocity of 15 ft/s at the position in **Figure 9**. If the cart has a constant rolling resistance of 10lb, determine the spring deflection and the location of the cart with respect to its initial position when it comes to rest on the horizontal surface. The spring constant is 300 lb/in.

**Figure 9**

(15 marks)

**END OF QUESTION**