SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2011 SESSION

SUBJECT CODE	:	FVB 20902
SUBJECT TITLE	:	FUNDAMENTAL ENGINEERING MECHANICS
LEVEL	:	BACHELOR
TIME / DURATION	:	12.30pm – 2.30pm (2 Hours)
DATE	:	10 MAY 2011

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.

2. This question paper is printed on one side 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. Answer all questions in English.

6. *OPEN BOOK*

THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: There are SIX (6) questions. Answer FIVE (5) questions only.

(Total: 100 marks)

Please use the answer booklet provided.

Question 1

a) Find X and Y components of the given forces system shown in the figure 1.
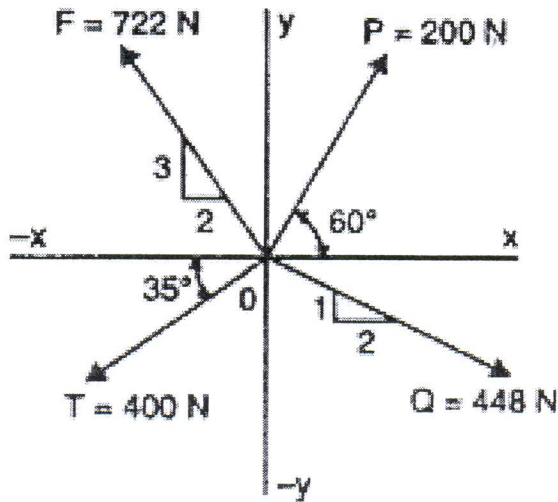

Figure 1

(10 marks)

b) Two wires are attached to a bolt in a foundation as shown in figure 2. Determine the pull exerted by the bolt on the foundation.
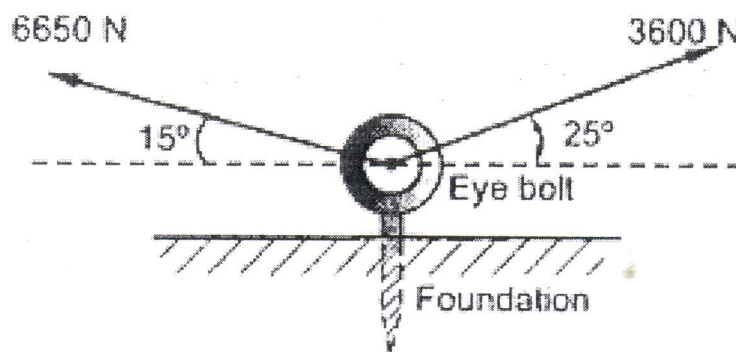

Figure 2

(10 marks)

Question 2

A 10 kg block is attached to a link of negligible mass and kept on a conveyor belt moving to the right as shown in figure 3. Knowing that μ_s=0.34 and μ_k=0.30, find the force developed in link AB and horizontal minimum force that is required to be applied on the belt to maintain the motion.
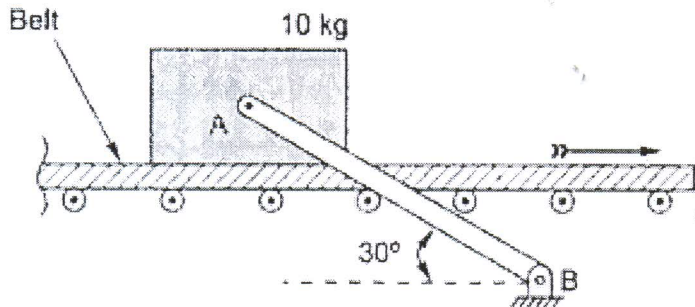

Figure 3

(20 marks)

Question 3

A single square threaded screw of a machine vise has mean radius 18 mm and has 2 threads per cm. clamping force P of 10 N magnitude applied at B at right angles to the handle produce a clamping force of 100 N on the job as shown in the figure 4. If μ_s = 0.18 in the threads, compute frictional torque M_A developed at A, due to the thrust exerted by screw on the jaw. Also find force P^1 required to be applied at B to loosen the grip of vise. Take a= 150 mm, b = 200 mm, and c = 240 mm.
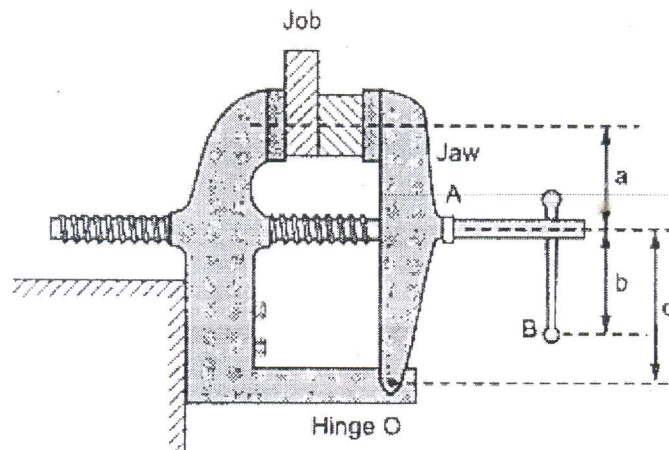

Figure 4

FVB 20902 FUNDAMENTAL ENGINEERING MECHANICS

(20 marks)

Question 4

The pitch of a screw jack is 12 mm, the mean diameter of the square thread on the spindle is 60 mm, and the lever is 900 mm long. If μ_s =0.008, find the necessary effort at the end of the lever:

(a) For lifting a load of 30 kN.

(5 marks)

(b) For lowering a load of 30 kN.

(5 marks)

(c) Efficiency of the screw jack for raising the load

(5 marks)

(d) Efficiency of the screw jack for lowering the load

(5 marks)

Question 5

An automobile of mass 4000 kg is travelling at 45 km/hr on a level road. The height of centre gravity of the vehicle is 1.2 m above the road surface and the distance between the two axles is 2.8 m. The distance of centre of gravity from the front axle is 1.6 m.

Find the distance covered by the automobile in coming to stop, if brakes are applied on (i) rear pairs of wheels only; (ii) front pair of wheels only, and (iii) both the pair of wheels. Take resistance to motion by application of brakes as 20 % of the normal reaction.

(20 marks)

Question 6

An open belt drive connects two pulleys 90 cm and 60 cm diameters mounted on the two parallel shafts 3 m apart. The maximum belt tension is 2000 N. The coefficient of friction is 0.3. The driving pulley of diameter 90 cm runs at 300 rpm.

Calculate:

(a). Initial tension in the drive.

(10 marks)

(b). Torque acting on each shaft.

(5 marks)

(c). Power transmitted

(5 marks)

END OF QUESTION

3