

**Prince of Songkla University  
The Faculty of Engineering**

**Final Examination Semester I**

**Academic Year: 2007**

**Date: Oct 3, 2007**

**Time: 09:00 -12:00**

**Subject: 225-602 Human Factors Engineering**

**Room: R300**

ทูลงการสอบ โทษขันต่ำคือ ปรบัคคในรายวิชานัน และพัคการเรียน 1 ภาคการศีกษา

**DIRECTIONS**

1. Only short note on an A4 piece (both sides), dictionary and calculator are allowed.
2. 7 questions are given on 4 pages, and should be done.
3. Total score is 100.
4. Please check all questions/ pages before start working.

Good Luck

*Asst.Prof Angoon Sungkhapong*



1. What is the human lever system? Explain each type of it and show them within a human body. ( 10 points)
2. How many factors that make up the biomechanic model? ( 10 points)
3. Two muscles develop tension simultaneously on opposite sides of a joint. Muscle A, attaching 3 cm from the axis of rotation at the joint, exerts 250 N of force. Muscle B, attaching 2.5 cm from the joint axis, exerts 260 N of force. How much torque is created at the joint by each muscle? What is the net torque created at the joint? In which direction will motion at the joint occur? ( 10 points)
4. The ring-pen as shown in figure 1 was an example of ergonomic design. Could you comment on this product in different aspects of hand tool design such as handle, weight, shape, wrist posture, and etc.? ( 20 points)



Figure 1: Usage of ring-pen

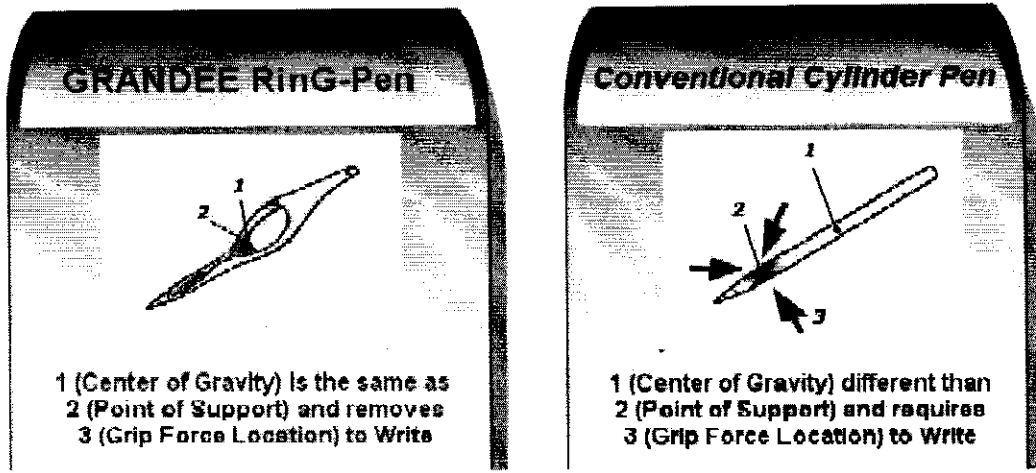


Figure 2: Show difference of ring-pen and conventional pen

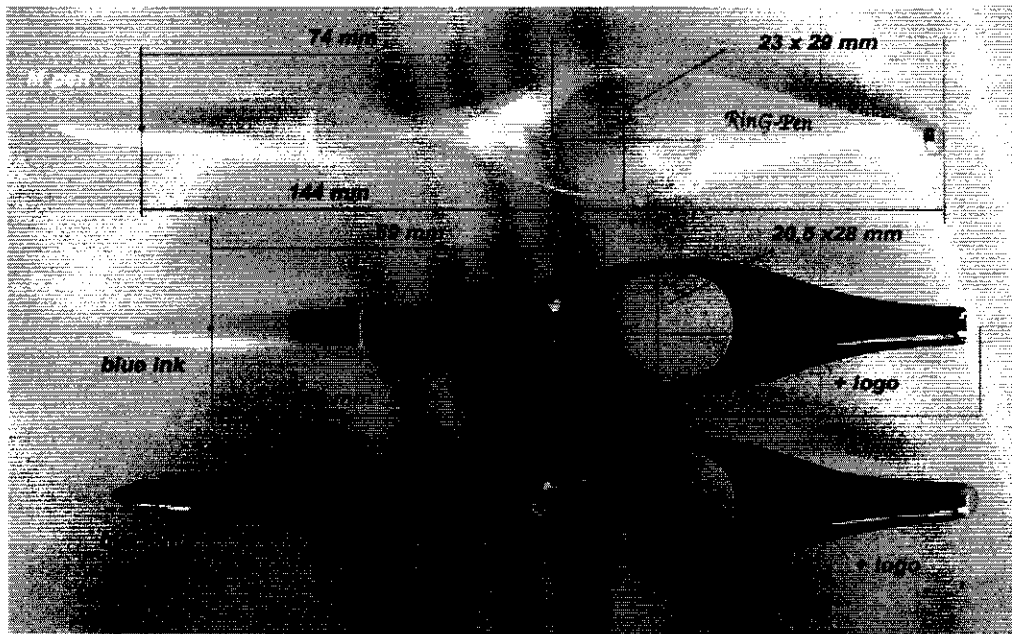


Figure 3: Dimension of ring-pen

5. You are assigned to design a workstation for the present-wrapping work in a supermarket during Christmas & New year season. All essential materials and equipments (such as box, ribbon, paper, scotch tape, scissors, etc.) must be provided for a lady who is working at this

Figure 4: Compression load & distance on a seat.

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workstation. The customer is coming to the workstation with her/his gift in queue. (State your assumption, if any.) Your designed workstation would include 1) the arrangement of materials, tools and equipment; 2) working posture (sitting or standing work or etc.); 3) work area; 4) state your working method; 5) others. Write down and sketch your work clearly. (20 points)

- 6. The tibia is the major weightbearing bone in the lower extremity. If 88% of body mass is proximal to the knee joint, A) how much compressive force acts on each tibia when a 600 N person stands in a anatomical position? B) How much compressive force acts on each tibia if the person holds a 20 N sack of groceries? ( 10 points)
  
- 7. According to figure 4, state your recommendation for a good chair design and also sitting posture for prevention from injuries. [Hint: Draft sketch may be helpful.] ( 20 points)

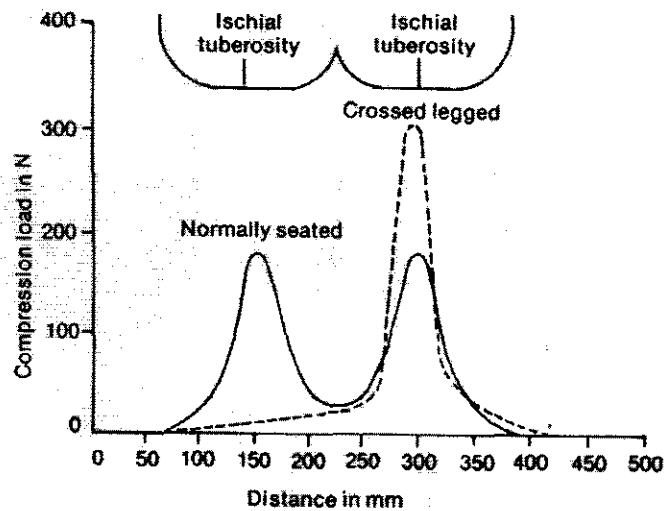


Figure 4: Compression load & distance on a seat.

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