Prince of Songkla University

The Faculty of Engineering

Midterm Examination Semester I   **Academic Year: 2005**

Date: Aug 4, 05   **Time: 9:00 -12:00**

Subject: 226-443/226-454 Ergonomics   **Room: R300**

ทุจริตในการสอบ โทษขั้นต่ำคือ ปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา

DIRECTIONS

1. Only short note on an A4 piece (both sides), dictionary and calculator are allowed.

2. 5 questions are given on 4 pages and must be done.

3. Total score is 100.

4. Your answers could be in English or Thai.

5. Please check all questions before start working.

Good Luck

Asst.Prof.Dr. Angoon Sungkhapong

1. Anthropometry, the measurement of a human body, is a widely applied

   scientific discipline. It is used both in measuring the bones of early people

   and in assessing the body sizes and proportions of contemporaries. The

   standard reference planes used in anthropometry are shown in Figure 1,

   and a set of anthropometry data is shown in Table 1.

   1.1 Give me the name of each reference plane. (5 points)

   1.2 How to apply anthropometric data for improving work efficiency?

      (5 points)

   1.3 Since natural postures and natural movements are necessary part

   of efficient work, how is it essential that the workplace should be suited

   to the body size and mobility of the operator?   (5 points)

   1.4 Explain the difference of pulling and pushing forces in the horizontal

   plane and vertical plane. (5 points)

   1.5 You are assigned to design tables for standing works (all kinds of

works—heavy, moderate, precision works).   What is the height of work

surface you'd like to recommend by using the anthropometric data as shown

in Table 1? Explain for each kind of work. (10 points)

2. Describe and show the position of human skeletal joints that work as Hinge Joint, Pivot Joint, Saddle Joint, Ellipsoidal Joint, and Ball & Socket. (20 points)

3. There are two kinds of muscular effort. Describe them and show me the good examples of each muscular effort. (10 points)

4. According to the human-machine system, how many categories of display equipments which are commercially used nowadays? Explain the advantages and limitations of each category. (20 points)

5. How do you realize that Ergonomics could improve productivity in production process? Explain and show a good case. (20 points)
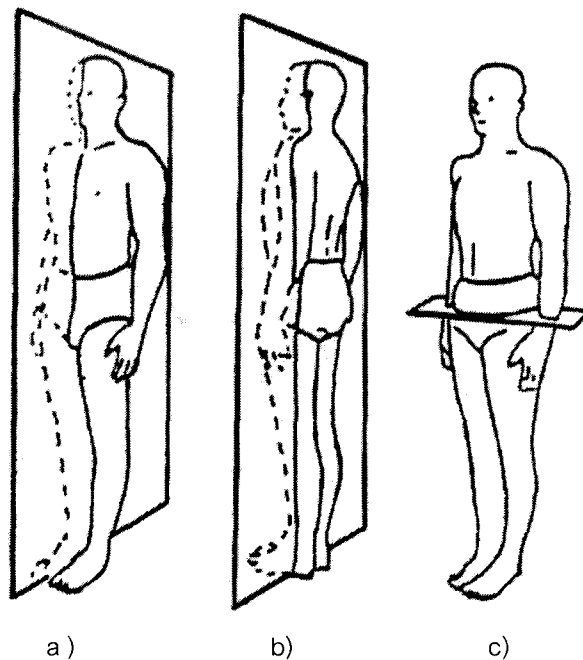

a)   b)   c)

Figure 1: Show reference planes.

Table 1: Show a set of anthropometry data (in mm.)

Dimension	Men				Women			
	5th percentile	50th percentile	95th percentile	SD	5th percentile	50th percentile	95th percentile	SD
1 Stature	1647	1755	1867	67	1528	1628	1737	64
2 Eye height	1528	1633	1743	66	1415	1515	1621	63
3 Shoulder height (acromion)	1342	1442	1546	62	1241	1332	1432	58
4 Elbow height	995	1072	1153	48	926	997	1074	45
5 Hip height (trochanter)	853	927	1009	48	789	860	938	45
6 Knuckle height	na	na	na	na	na	na	na	na
7 Fingertip height	591	653	716	40	531	610	670	36
8 Sitting height	855	914	972	36	795	851	910	35
9 Sitting eye height	735	792	848	34	685	738	794	33
10 Sitting shoulder height (acromion)	549	598	646	30	509	555	604	29
11 Sitting elbow height	184	232	274	27	176	221	264	27
12 Thigh height (thickness)	149	168	190	13	140	158	180	12
13 Buttock–knee length	569	615	667	30	542	588	640	30
14 Buttock–popliteal length	458	500	546	27	440	481	528	27
15 Knee height	514	558	606	28	474	514	560	26

na = not available

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