

**PRINCE OF SONGKLA UNIVERSITY**  
**FACULTY OF ENGINEERING**

**Midterm Examination : Semester II**

**Academic Year : 2006**

**Date : December 23, 2006**

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

**Subject : 225 - 346 Work Study**

**Room : R200**

ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น และพักการเรียน 1 ภาคการศึกษา

**Directions:**

1. Lecture notes, textbooks, electronic handheld calculator and dictionary are permitted to lead into examination room.
2. ALL questions are required answers.
3. You have to fill your name, last name, and ID on this page and fill only your name on the top right of all another pages.
4. There are 30 points for this examination.


First name Mr./Miss ..... Last name .....

Student ID .....

(Do not fill any data to this table)

Questions	points	Your points
1	4	
2	6	
3	4	
4	3	
5	5	
6	5	
7	3	
	30	

Asst. Prof. Charoen Jaitwijitra



Name .....

1. Choose the names from the following table and fill them in the blanks of question 1.1 to 1.4. Each name can be used more than once.

Frederick Winslow Taylor	Ernestine Gilbreth Carey	Frank Bunker Gilbreth, jr.
Lillian Evelyn Gilbreth	F.B. Gilbreth	Booth Watmough

- 1.1. .... was the pioneered of the “time study”?
- 1.2. The novel “Cheaper by the dozen” were written by .....
- 1.3. The brick layer operation was studied by .....
- 1.4. Who was the mother of twelve children? .....
2. Choose the words from the following table and fill in the blanks of question 2.1 to 2.6. Each word can be used more than once.

Therblig	Micromotion study	Simultaneous-motion-cycle chart
Flow process chart	Chronocyclegraphic method	Outline process chart
Cyclegraphic analysis	Travel chart	Flow diagram
Gilbreth	Multiple activity chart	String diagram

- 2.1. “The seventeen basic body motions” is known as.....
- 2.2. .... is applied for recording a job sequence by using five symbols including operation, transportation, delay, inspection, and storage.
- 2.3. A technique for analyzing the path of motion of a worker. A set of electric bulbs is attached to worker’s fingers and/or any parts of body, the light is flashed on quickly and off slowly.  
.....
- 2.4. .... is commonly used together with flow process chart. It shows the layout and path of movement of the subject. The symbols of flow process chart are also applied to it.
- 2.5. A chart which very useful for recording and analyzing repetitive short cycle jobs. It displays the activities of more than one subject (worker or machine) on a common time scale.  
.....

Name .....

2.6. A tabular record for presenting quantitative data about the movement of workers, materials or equipment between any numbers of places. ....

3. Give an example of activity which:

3.1. can be eliminated unnecessary activities (requires only one example).

3.2. can be combined to one activity (one example).

3.3. can be rearrange in order to use less time (one example).

3.4. can be simplified to be done easier (one example).

4. The following data was gathered from a factory:

	Year 2004	2005
Total number of pieces produced	1,250,000	1,750,000
Total man-hours	800,000	1,200,000

Which year had higher performance when measured in term of productivity? Your answer should be included details of calculation.

5. Make a left-and-right hand chart of opening the cap of a Pepsi bottle with cap opener (ที่เปิดฝาขวด) by an operator. (Write your answer to the blank left-and-right hand chart in page 7.)

Before starting this operation the operator is sitting on a chair and the chair is located close to a table. He is holding a cap opener in right hand and places both hands on table near his chest (position A in Fig. 1. The “Pepsi” is placed on table to the left of operator within reach (position B).

The operation cycle to be started from the left hand begins to reach for bottle, grasps, and moves bottle to position A. This instant the bottle is held by the left hand. When the bottle is completely held by left hand, the opener is moved to the top of bottle, positions to cap, and removes cap. The bottle is then moved (surely, by left hand) back, and placed to B. After that both hands are moved back simultaneously to A. The operation cycle is finished when both hands are come back to position A.

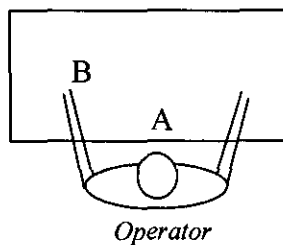


Fig.1 A table and operator.

6. Use the following information to construct “flow process chart – worker type”: (Write your answer to the blanked flow process chart in page 8.)

The Coca-cola truck, of The Haadpetch Company, comes to deliver “Coke” for a grocery at the faculty of engineering in every Tuesday morning. After turning off the truck engine, the driver open door and climb down from truck. He goes to carries a two-wheel hand truck, which is kept behind the driver’s seat, and places down to floor (see Fig. 2). Then he unloads a crate (Fig. 3) from truck and loads it to the hand truck. He transports the hand truck to the grocery (ร้านขายของชำ) which 30 meters away from the truck. When he arrives at the grocery he unloads the crate (from hand truck) to floor and loads a crate (which already contains 24 empty bottles) to the hand truck. After that he contacts with the shopkeeper and receives cash. Then he goes back to truck with hand truck. When he arrives at the truck he unloads empty crate from hand truck and loads it to truck. He transports empty hand truck to the position where the hand truck is kept. He lifts up hand truck and places it at the same position before it is used.

Two-wheel hand truck



Fig. 2 A Coca-cola truck with a 2-wheel hand truck

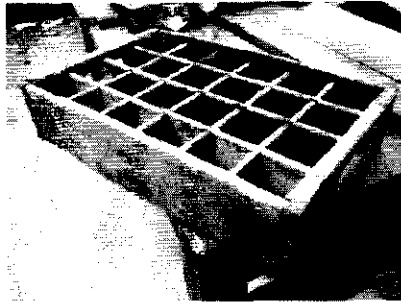
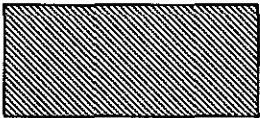




Fig. 3 An empty crate for 24 bottles

7. Use the following information to construct an outline process chart:

A component of a chair model R123, which is made from rubber wood, has five parts as shown in the following bill of material:

level	Part names	Quantities	Dimensions in millimeters (Width*Length*Height)
0	Rectangular board 	1 piece	300 * 800 * 20
1	Shorter Bar 	2 pieces	30 * 300 * 20
1	Longer Bar 	2 pieces	30 * 800 * 20

The shorter bars are assembled to the rectangular board, then the longer bars are assembled. The times used for assemble shorter bars is 3.00 minutes while the longer bars required 4.00 minutes. The process of each part is shown in the following table:

Part names	Process	Time (min.)
Rectangular board	1. Cuts to length	0.05
	2. Grinds both faces	5.00
	3. Inspects quality	0.50
	4. Mills slots all edges	1.25
Shorter bar	1. Cuts to length	0.05
	2. Grinds all faces	3.00
	3. Mills to shape	2.00
	4. Inspects quality	0.50
Longer bar	1. Cuts to length	0.05
	2. Grinds all faces	3.50
	3. Mills to shape	2.50
	4. Inspects quality	0.50



