

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

**Midterm Examination** : Semester II

**Academic Year** : 2005

**Date** : December 17, 2005

**Time** : 09:00 – 12:00 hrs.

**Subject** : 225 - 346 Work Study

**Room** : R200

ทูลงการสอบ โทษขันต่ำปรับตกลในรายวิชานั้น และพัทการเรียน 1 ภาคการศึกษา

**Please read this first!**

1. The following materials can be led into examination room :-
  - Lecture notes, handouts, or textbooks.
  - Electronic handheld calculator.
  - Electronic dictionary.
2. Do not allow for communication equipment such as PDA phone, mobile telephone, and laptop (notebook) computer.
3. You have to write answers to ALL questions.
4. You have to fill your name and ID on this page and on the top right of the remainder.
5. There are seven problems with 35 points.

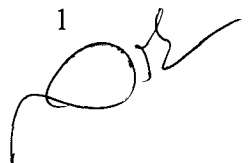
First name Mr./Miss ..... Surname .....

Student ID .....

Score (will be filled by lecturer)

Problem no.	Points	Your points
1	5	
2	3	
3	2	
4	4	
5	7	
6	7	
7	7	
	35	

\*\*\*\*\* This test is prepared by Asst. Prof. Charoen Jaitwijitra \*\*\*\*\*

1  


Name.....

1. Describe the relationship between the **national productivity** and the **quality of life of people**.

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2. There are five input resources of an enterprise, i.e., land and buildings, materials, plant/machines/equipment, energy, and human resources. Explain why the **capital cost** does not include in the input resources?

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Name.....

3. Why the “**Motion and time study**” was changed to “**Work study**”?

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4. One of the three factors that should be considered when selecting a job to be studied is the economic or cost-effective considerations. What types (or characteristics) of jobs should be selected to be studied correspondingly to the economic factor?

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Name.....

5. Use the following information for recording the multiple activity chart :

A user is sitting on chair and working with a microcomputer. He wants to copy a DVD movie into a DVD-R disk. The microcomputer has being powered on.

The user presses the DVD drive button (time spent for 1 second) and the tray of the drive is ejected (2 seconds are required starting from pressing the button). Then the user grasps a DVD disk and places it into the tray and presses the button again (this operation requires 3 seconds) in order to close the tray (2 seconds are required after the button is pressed). After that the disk will be verified automatically for 5 seconds. As the computer is verifying the disk, the user does nothing until the computer is finished from its task. When the disk is completely verified, the user needs 10 seconds for entering a series of commands to computer. After that the computer writes data into disk and the disk will be slid out automatically after it is written (this operation requires 5 seconds). Then the user grasps the disk from tray and presses button (this requires 3 seconds). After pressing the button, the tray is slid back (closed) into its original position (2 seconds).

After finishing from recording the data on multiple activity chart (on next page), you have to fill answers to the following questions.

- Cycle Time = ..... Seconds
- Computer Utilization = ..... Per cent
- User Utilization = ..... Per cent



Name.....

### Multiple-activity chart

Seconds	User	Computer	Seconds
1			1
2			2
3			3
4			4
5			5
6			6
7			7
8			8
9			9
10			10
11			11
12			12
13			13
14			14
15			15
16			16
17			17
18			18
19			19
20			20
21			21
22			22
23			23
24			24
25			25
26			26
27			27
28			28
29			29
30			30
31			31
32			32
33			33
34			34

Name.....

6. Complete the two-handed process chart by using information from fig. 1 and 2.



Fig. 1 Bolt and washer assembly : A, rubber washer; B, plain steel washer; C, lock washer; D, bolt

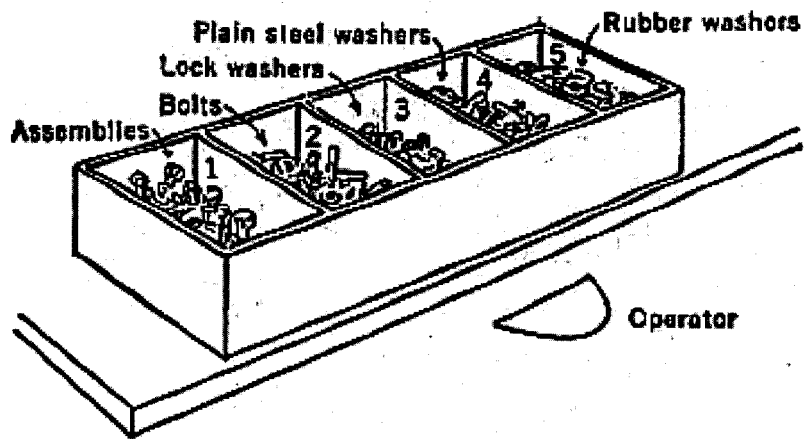


Fig. 2 Workplace layout

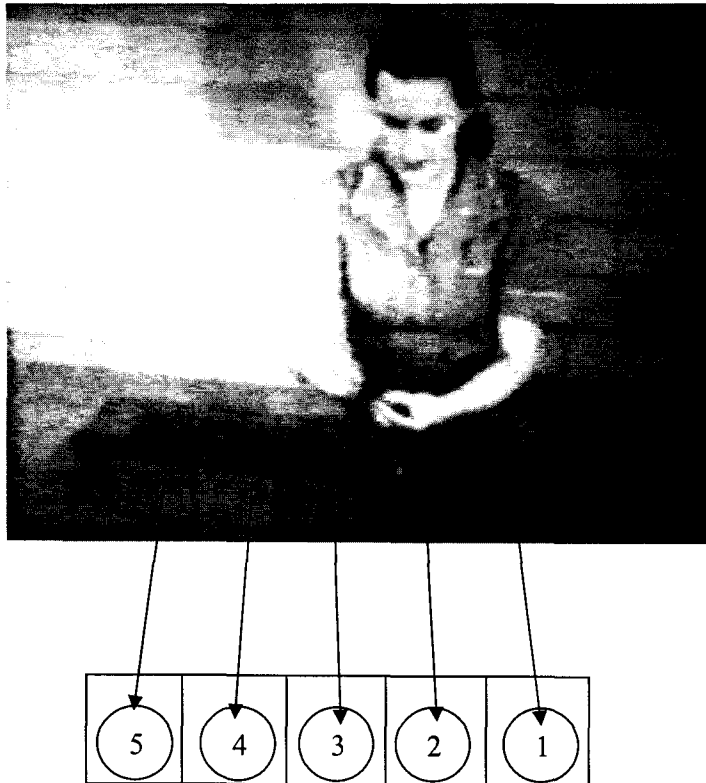
Name.....

**Two-handed process chart: Assembles bolt and washers**

Left-hand description	○	⇒	D	▽	○	⇒	D	▽	Right-hand description
Carries finished assembly to bin 1									Reaches for lock washer in bin 3
Releases assembly into bin 1									Grasps lock washer from bin 3
Reaches for bolt in bin 2									Carries lock washer to central position
grasps bolt from bin 2									
Carries bolt to central position									Positions lock washer
Holdsbolt									Assembles lock washer onto bolt
Holdsbolt									Reaches for plain steel washer in bin 4
Holdsbolt									Grasps steel washer from bin 4
Holdsbolt									Carries steel washer to bolt
Holdsbolt									Positions steel washer
Holdsbolt									Assembles steel washer
Holdsbolt									Reaches for rubber washer in bin 5
Holdsbolt									Grasps rubber washer from bin 5
Holdsbolt									Carries rubber washer to bolt
Holdsbolt									Positions rubber washer
Holdsbolt									Assembles rubber washer
Carries finished assembly to bin 1									Releases finished assembly

Name.....

7. A worker is assembling bolt and washers, using the same procedure as problem 6, as shown in **fig.3** while **fig.4** is shown the improved method. **Refer to the theory of the Principles of Motion Economy** explains how the improved method is more efficient than the old method.

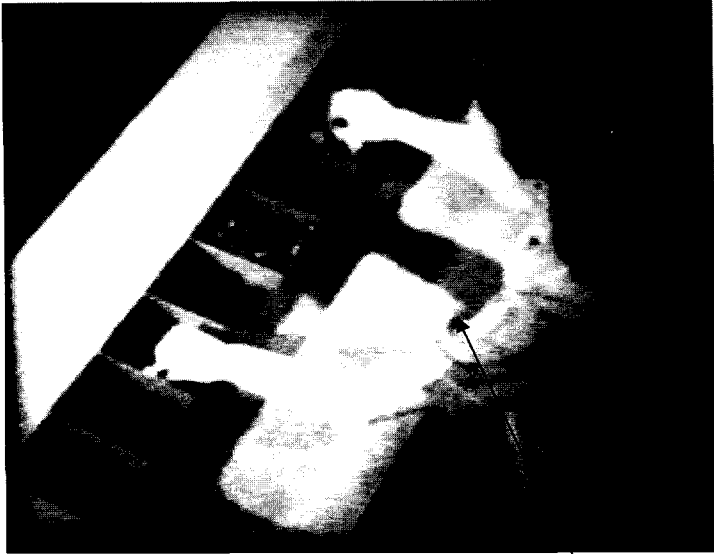


*1 = assemblies, 2 = bolts, 3 = lock washers, 4 = plain steel washers, 5 = rubber washer*

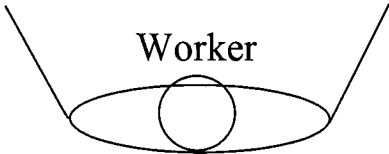
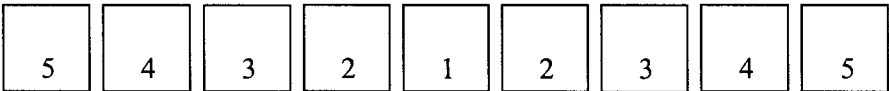
**Fig. 3** Bolt and washer assembly: original method



Name.....



Counter bored holes (fixtures)



*1 = bolts, 2= lock washers, 3 = plain steel washers, 4 = rubber washer, 5 = assemblies*

**Fig. 4 Bolt and washer assembly: improved method**

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