

IE441 FIRST MIDTERM EXAM 6/4/2005

Fill in the blanks (Questions 1 to 5)

- 1- (4 points) Productivity is the ratio of to
- 2- (8 points) The purposes of Motion and Time study are.....
.....and.....
- 3-(2 points)is the study of fundamental elements or subdivisions of an operation by means of a motion picture camera and a timing device which accurately indicates the time intervals on the motion picture film.
- 4-(6 points) The process of putting a new product into production usually consists of the three following phases:.....and.....
- 5-(8 points) Possible solutions for the work method could be developed by..... unnecessary work,.....operations or elements,..... the sequence of operations and.....the necessary operations.

Choose the correct answer (Questions 6 to 10 are 6 points each)

- 6- Work sampling could be used in:
- a. Activity and delay sampling
 - b. Performance sampling
 - c. Work measurement
 - d. All the above
- 7- The number of observations in work sampling studies increases as the:
- a. desired accuracy is increased
 - b. confidence interval increased
 - c. the control chart is plotted
 - d. a and b only
- 8- Continuous performance sampling can provide information about:
- a. Sample size
 - b. control limits
 - c. percentage of time working
 - d. a and b only
- 9- Predetermined Time Systems can be classified according to:
- a. extent of method description
 - b. confidence level
 - c. a and b
 - d. none of the above
- 10- When compared to MTM1, MTM3 is:
- a. more accurate
 - b. more expensive to apply
 - c. more detailed
 - d. none of the above

11- (10 points) A worker produces an average of 500 parts per day. The standard time to produce one part is 0.9 minute. Calculate the performance index for this worker.

12-(20 points) A work sampling study of a machine was performed and resulted in 3000 working observations (out of 5000 total observations). Determine whether the results are within the desired accuracy and also calculate the true value for p (percentage of idle observations) if the desired accuracy is $\pm 5\%$ and the confidence level is 95%.

13- (12 points) Use MTM-3 (use code conventions for recording MTM) to find the time (in minutes) to assemble one finished part for the manual assembly task described below:

A worker is sitting in front of a work bench with his body touching the edge of the work bench and three containers are on the bench. The first container is for the finished parts and is located exactly at the midline of the body with a vertical distance of 10 inch from the work bench edge. The second container is full of washers and is located 12 inch to the right of the finished parts container with the same vertical distance from the work bench. The third container is full of bolts and is located 12 inch to the left of the finished parts container with the same vertical distance from the work bench. The worker starts the cycle with both hands on the top of the finished parts container. The worker then moves his right and left hand at the same time towards the washers and bolts containers. The worker then picks one washer with his right hand and one bolt with his left hand at the same time. Both hands are then moved to the top of the finished parts container. The worker then assembles the washer with the bolt using both hands without the need for any pressure. Both the washer and the bolt are easily picked up, easy to handle, symmetrical, smaller than 1/4"x1/4"x1/8" in size, and no need for weight allowance (negligible weight effect) or any correcting motions.

Useful formulas and tables

$$\text{Idle Percentage} = \frac{\text{Number of idle observations}}{\text{Total number of observations}}$$

$$Sp = 2\sqrt{\frac{p(1-p)}{N}}$$

$$\text{Control limits for } p = p \pm 3\sqrt{\frac{p(1-p)}{n}}$$

$$\text{Standard time} = \text{normal time} \times \frac{100}{100 - \text{allowance in percent}}$$

MTM3

MOTION

- 1- Handle
- 2- Transport
- 3- Step and Foot Motion
- 4- Bend and Arise

SYMBOL

- H
- T
- SF
- B

Range	Code	HA	HB	TA	TB
Up to 6"	-6	18	34	7	21
Over 6"	-32	34	48	16	29
		SF	18	B	61

1hr=100,000 TMU