



# Tutorial Letter 201/1/2018

**WORK STUDY**

**MNO2604**

**Semester 1**

**Department of Operations Management**

This tutorial letter contains important information  
about your module.

BARCODE

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## 1. INTRODUCTION

*Dear student,*

Your academic year is rapidly coming to a close. If you have submitted your assignments, your examination lies ahead. I appeal to you to start studying very hard. Both academic institutions and learners regard examinations as an important assessment tool. Our aim is to give you the opportunity to demonstrate to yourself and the examiner that you have acquired knowledge, which you can use to enhance yourself.

Work purposely each day so that the examination becomes a challenge and not punishment. Let us work together and face this challenge together.

Success with your studies.

## 2. EXAMINATION VENUES, DATES AND TIMES

Please note that the venues, dates and times of the examinations will be forwarded to you, ensure that you do receive your examination permit. Please contact examinations if you do not receive this.

## 3. FORMAT OF THE EXAMINATIONS

**Please note the format of the examination paper.** This examination paper consists of **two** sections.

### SECTION A:

This section consists of 1 question which has a total of 10 marks.

**Question 1** consists of 10 multiple-choice questions: x 1 mark each.

**Please note that you do not need a Mark Reading sheet to answer this question.**

Please answer this question in your answer book.

### SECTION B:

This section consists of three questions, namely, **Question 2, 3 and 4.**

This section consists of essay type questions, process charting and calculations.

**You have to select any two questions and answer them for 60 marks out of 70.**

Therefore:

**SECTION A:**

**Question 1:** ALL STUDENTS **MUST** ANSWER THIS SECTION = 10 Marks

**SECTION B:**

**Questions 2, 3 and 4:** SELECT **ANY TWO** (2) OF THESE THREE (3) QUESTIONS = 60 Marks

**TOTAL: = 70 marks**

Make sure that the following information appears on the cover of your answer book:

- Your student number,
- The module code (**MNO2604**)

#### 4. FOLLOW-UP ON ASSIGNMENTS

Read these comments carefully, as it outlines areas in which students normally have a problem. ***Please note that your examination paper will consist of only ten (10) multiple choice questions and the balance is made up of essay type questions, process charting and calculations.***

**Theory:**

- Do not write word-for-word from your study guides.
- Read the questions at least twice before answering.
- Look at the mark scheme and answer accordingly, often learners write too much information or too little information.
- If the question asks you to discuss, you should not outline or list your answer. You will be penalised if you do.
- Minor calculation errors. Ensure that you double-check your answers prior to submission. This also applies to your examination papers.
- Space your work out – there is sufficient space available in your answer sheet.

**Process charting:**

- Make use of the charts that are supplied to answer the process charting questions.
- Ensure that you number each step, and also number your symbols.
- Do not forget to join each symbol – learners lose marks for this.
- Note that only two symbols feature in the outline process chart, (Inspection and operation)
- Complete the information at the top of the process charts.
- Complete the summary of events of the chart.

**5. MEMORANDUM FOR ASSIGNMENTS 1 AND 2 (Semester 1 only)**

**MEMORANDUM FOR ASSIGNMENT 01:  
COMPULSORY ASSIGNMENT  
(Semester 1 only)**

This assignment for consists of **20** multiple-choice questions relating to Work study and method study (units 1 to 9).

**MULTIPLE-CHOICE QUESTIONS**

Answer the following 20 multiple-choice questions. Each question is worth 1 mark. No negative marking will be applied.

1. Work study is important to an organisation because it can assist ....

**Answer: 3 a manager in achieving results that would make his/her organisation more effective.**

2. Almost every industry, business and service organisation are restructuring themselves in order to operate more effectively due to ever-increasing competition from all parts of the world. With this in mind, the definition, "the systematic examination of the methods of carrying out activities so as to improve the effective use of resources and to set up standards of performance for the activities being carried out", refers to ....

**Answer: 1 work study.**

3. There is nothing new about investigations and improvements in the workplace; good managers have been investigating and improving ever since human effort was first organised on a large scale. "The prime value of work study lies in the fact that, by carrying out its systematic procedures, a manager can ...."

**Answer: 2 achieve results as good as or better than the less systematic genius was able to achieve in the past.**

4. The steps "select, record, examine, develop, evaluate, define, install, and maintain," are outlined for which one of the following concepts?

**Answer: 1 Work study.**

5. The structure of work study comprises two main techniques. If a work-study investigation is conducted in an organisation, these two techniques, if conducted properly, can lead to an improvement in productivity. Which of the following are the two techniques of work study?

**Answer: 4 Method study and work measurement**

6. The objective of work study is to assist management in obtaining optimum utilisation of the human and material resources available to the organisation to accomplish the work that has to be completed. With this in mind, state which of the following are objectives of work study:

**Answer: 3 abc**

- a The most efficient and effective application of the plant and equipment
- b The most efficient and effective application of human resources
- c The evaluation of material usage

7. The importance of work study as a management aid is being recognised on a larger scale as organisations gear up to become ....

**Answer: 1 more effective and efficient in their operations.**

8. Work study succeeds because it is systematic. This one simple statement can sum up the nature of work study because systematic investigations take time and in most organisations, it makes sense to separate the task of work study from the management task. Which of the following statements summarises the nature of work study?

**Answer: 4 abcd**

- a It is a means to improve the productivity or efficiency of a working environment by re-organising the work. Normally, it requires little or no capital outlay in terms of plant, equipment or tools.
- b It is systematic and therefore, work study ensures that no factor that could influence the efficiency or effectiveness of the work is left out, either while analysing the original method or process, or when developing new ones. A systematic approach therefore ensures that all relevant information is obtained for analysis.
- c It is the most accurate method that has yet been developed for determining work standards and it is essential for efficient and effective planning and control, especially of production.
- d It is a "tool" that can be used anywhere, for manual labour or machinery utilisation. It can also be used in workshops, offices, stores, laboratories, industries that supply services, retail companies, restaurants, etc.

9. *What do you understand by the term "aids for organisational effectiveness"? What are these aids and how do they help make an organisation more effective?*

The above constitute some of the questions that immediately run through your mind when you see the title, "Aids for effective management". In view of these statements, which of the following are aids that can assist management to become effective?

**Answer: 4 abcd**

- a Variety reduction.
- b Value analysis.
- c Motion study.
- d Programme evaluation and review technique.

10. The definition, "the systematic recording and critical examination of the factors and resources involved in an operation, in order to develop a more efficient method and to reduce costs", refers to ....

**Answer: 3 method study.**

11. The steps, select, record, examine, develop, define, install, and maintain, are outlined for which one of the following concepts?

**Answer: 3 Method study**

12. One of the objectives of method study is to develop better ways of doing things and reducing costs in the organisation. It contributes to improving efficiency by eliminating unnecessary work and delays and to preventing other forms of waste. Which of the following can be considered objectives of method study?

**Answer: 3 abc**

- a Improved planning and design of factories and offices
- b Improved work procedures, processes and methods
- c Improved utilisation of raw materials, plant and equipment

13. A work study officer uses process charts during a method study investigation to get as much information as possible in order to improve the methods of working. With this in mind, state in which step of the method study procedure will the work study officer make use of process charts?

**Answer: 1 Step 2: Record.**

14. "What is a systematic investigation and how does it relate to method study?" A systematic investigation can be defined as a systematic approach to a problem with the purpose of solving the problem in the most advantageous way possible. It is based on certain principles. State which of the following can be considered principles of a systematic investigation?

**Answer: 4 abcd**

- a The purpose of the investigation must be clearly understood and drafted during the preliminary survey and agreed upon before starting the task itself.
- b All relevant information about the problem under investigation must be obtained and recorded. Information is obtained through personal observation, interviews, relevant documentation, etc.
- c The investigation must be carried out according to a plan that was drafted beforehand. The plan must be of such a nature that the work study officer's time is spent in the best way and that the investigation will not be interrupted, as far as possible. Such a plan should also be flexible.
- d The conclusions and recommendations must not come as a surprise to the staff. This will happen if staff are not involved in the investigation. Always acknowledge the contributions of all staff members.

15. The relationship between method study and systematic investigation procedures is divided into three phases. State which of the following are these phases?

**Answer: 2 bcd**

- b Reconnaissance phase
- c Development phase
- d Evaluation phase

16. During a method study investigation, it is necessary to conduct a preliminary survey (also known as a pilot study) and an analysis of information. This is a limited or small investigation into the problem area. Its purpose is to put the problem into perspective and to determine whether it is worthwhile undertaking the investigation or not. With this in mind, state which of the following can be considered purposes of the preliminary survey:

**Answer: 4 abcd**

- a To determine whether the problem had originally been defined correctly, what the causes of the problem are, and what the possible consequences of the problem will be.
- b To determine the scope of the problem, that is, any deviation from the original instruction during the investigation could be observed in time so that the final solution covers the whole problem area.

- c To determine whether the problem belongs with work study – although work study covers a large area in the organisation, many areas do not fall within the field of work study.
- d To determine whether the investigation is justified

17. To compile process charts the work study officer utilises process chart symbols. There are six such symbols. Which one of the following symbols denotes a storage?

**Answer: 1** 

18. Which one of the following charts uses two symbols only, namely, operation and ~~transport~~?  
*Should read "inspection".*

**Answer: 2 Outline process chart**

19. The questioning technique employs a specific sequence that is used for both primary and secondary questions. In this technique, the recorded information is critically examined. In view of this, state which one of the following is the correct sequence of the primary questions?

**Answer: 4 Purpose, place, sequence, person and means.**

20. Process charts fall into two distinct categories, namely, charts that indicate a process sequence and charts that indicate a time scale. State which two of the following charts uses a time scale to record actions?

**Answer: 3 Multiple activity chart and simo charts.**

**SEMESTER 1: Compulsory Assignment 01: 20 questions x 1 mark = 20 marks**

**MEMORANDUM FOR ASSIGNMENT 02:  
COMPULSORY ASSIGNMENT  
(Semester 1 only)**

This assignment for consists of **20** multiple-choice questions relating to work measurement (units 10 to 16).

**MULTIPLE-CHOICE QUESTIONS**

Answer the following twenty (20) multiple-choice questions. Each question is of equal value and is allocated one (1) mark. No negative marking will be applied.

1. "The application of techniques designed to set the time in which a qualified worker must carry out a task at a defined rate of working" refers to the definition of ....

**Answer: 4 work measurement.**

2. Work measurement looks at investigating, reducing and eliminating ineffective time, that is, time during which no effective work is being carried out. Which of the following explains the value of work measurement for an organisation?

**Answer: 4 abcd**

- a It provides management with a technique of measuring the time taken to perform an operation.
- b It is also valuable because it can be used to set standard times for operations.
- c The development of standard times allows management to pick up ineffective times in the work processes.
- d Standard times allow management to calculate rest allowances for operations.

3. The value of work measurement lies in the fact that it can be used to ....

**Answer: 4 provide an organisation with a technique to measure time.**

4. The application possibilities of work measurement are countless. Which of the following would you say are application possibilities of work measurement?

**Answer: 4 abcd**

- a It serves as an important aid to evaluating new or improved methods. By comparing the durations of alternative solutions with one another, the method with the shortest duration may be identified as a possible best solution.
- b It can be used to determine present and future requirements for labour, materials, machinery, floor space, personnel, etc.

- c It serves as an aid to planning and scheduling work (production).
- d It serves as a basis for the control of production and labour.

5. Work measurement techniques are divided into two important parts, namely, direct work measurement techniques and indirect work measurement techniques. In response to this statement, indicate which two of the following are direct work measurement techniques?

**Answer: 3 cd**

- c Time study
- d Work (activity) sampling

6. Similar to the basic procedures of method study, a set of procedures must be followed to achieve success in a work measurement investigation. State which one of the following is the correct procedure of work measurement?

**Answer: 3 Select, record, examine, measure, compile and define.**

7. The definition, "a work measurement technique for recording the times of performing a specific job or its elements under specified conditions and for analysing the data to obtain the time that an operator will need to carry it out at a defined rate of performance", refers to ....

**Answer: 1 time study.**

8. "The amount of work 'contained in' a given product or process, measured in work hours or machine hours" refers to a definition of ....

**Answer: 2 work content.**

9. Which one of the following definitions refers to the concept of standard pace (rating)?

**Answer: 2 The assessment of the worker's rate of working relative to the observer's concept of the rate corresponding to a standard.**

10. Given the information below, calculate the "basic time" and state which one of the following is the correct answer. Work to three (3) decimal places.

Element number	Observed time	Observed rating	Basic time
1	1,889	85	1.605 or 1.6056

**Answer: 4 1.606 centi-minutes**

11. Given the information below, calculate the "selected basic time" (SBT) and state which one of the following is the correct answer. Work to three (3) decimal places.

Element number	Observed time	Observed rating	Basic time	Frequency	Selected basic time
1	1,889	85	1.606	2/1	3.212

**Answer: 3 3.211 centi-minutes**

12. Given the information below, calculate the "actual time" and state which one of the following is the correct answer. Work to three (3) decimal places.

Element number	Observed time	Observed Rating	Basic time	Frequency	Selected basic time	Rest allowance	Actual time
1	1,889	85	1.606	2/1	3.212	12	3.597

**Answer: 4 3.597 standard minutes**

13. Use the information given below to calculate the "error margin" and state which one of the following is the correct answer:

Clock time = 30.00 minutes  
 All observed times = 27.54 minutes  
 Time elapsed before study (TEBS) = 1.11 minutes  
 Time elapsed after study (TEAS) = 1.04 minutes

**Answer: 1 1.03%**

14. Any work study officer must be able to determine the reliability of a standard time scientifically, especially when standard times are used in incentive schemes. In such cases, a work study officer must use the statistical formula to determine the scope of the study. Consider the example below. A task produced the observed times set out below. Calculate the number of observations and state which of the following is the correct answer.

Element number	1	2	3	4	5	
Observed times	4.88	8.77	7.97	5.10	6.00	$\sum x = 32.72$
$x^2$	23.81	76.91	63.52	26.01	36.00	$\sum x^2 = 226.25$

$$\begin{aligned}
 N &= \left[ \frac{40 \sqrt{n' \sum x^2 - (\sum x)^2}}{\sum x} \right]^2 \\
 &= \left[ \frac{40 \sqrt{5 (226.25) - (32.72)^2}}{32.72} \right]^2 \\
 &= \left[ \frac{40 \sqrt{1131.25 - 1070.60}}{32.72} \right]^2 \\
 &= \left[ \frac{40 \sqrt{60.65}}{32.72} \right]^2 \\
 &= \left[ \frac{40 \times 7.79}{32.72} \right]^2 \\
 &= \left[ \frac{311.6}{32.72} \right]^2 \\
 &= 9.52^2 \\
 &= \underline{90.63} = \underline{91 \text{ cycles}}
 \end{aligned}$$

Answer: 3      91 cycles

15. The following table shows the observation times and ratings of a time study. It involves two operators employed in the packaging department of an organisation. Their task involves assembling boxes for packaging. You are required to do the following:

- Calculate the standard time for operator A to pack one box.
- Calculate the standard time for operator B to pack one box.
- State which of the following answers are the correct standard times.

Box number	Operator A			Operator B		
	Observed time	Rating	Rest allowance	Observed time	Rating	Rest allowance
1	1,41	80	0	2,11	80	0
2	1,50	75	0	1,96	85	0
3	1,71	70	0	3,41	70	0
4	1,26	85	0	3,36	75	0
5	1,37	80	0	3,44	70	0

a. Standard time for Operator A to pack one box:

Element	Observed time	Observed rating	Basic time	Rest allowance	Actual time
1	1,41	80	1.128		
2	1,50	75	1.125		
3	1,71	70	1.197		
4	1,26	85	1.071		
5	1,37	80	1.096		
<b>Total actual time:</b>					<b>5.617</b>
Contingency allowance:					None
<b>Standard time:</b>					<b>5.62</b>

b. Standard time for Operator B to pack one box:

Element	Observed time	Observed rating	Basic time	Rest allowance	Actual time
1	2,11	80	1.688		
2	1,96	85	1.666		
3	3,41	70	2.387		
4	3,36	75	2.520		
5	3,44	70	2.408		
<b>Total actual time:</b>					<b>10.669</b>
Contingency allowance:					None
<b>Standard time:</b>					<b>10.67</b>

**Answer: 2 Operator A = 5.62 basic minutes AND Operator B = 10.67 basic minutes**

16. The following table shows the observed times and ratings of an operation involving 10 elements. A contingency allowance of 5% is applicable. Calculate the standard time for this operation and state which one of the following is the correct answer:

Element number	Observed times	Observed rating	Basic time	Freq.	SBT per element	Rest allowance %	Actual time
1	0.66	115	0.759	2/1	1.518	12	1.700
2	1.65	75	1.238	1/1	1.238	14	1.411
3	1.62	80	1.296	1/1	1.296	15	1.490
4	1.86	95	1.767	1/1	1.767	13	1.997
5	1.21	85	1.029	1/1	1.029	12	1.152
6	0.54	115	0.621	1/1	0.621	15	0.714
7	0.76	100	0.760	1/1	0.760	14	0.866
8	1.68	75	1.260	1/1	1.260	13	1.424
9	0.52	115	0.598	1/1	0.598	16	0.694
10	1.94	70	1.358	1/1	1.358	14	1.548
<b>Total actual time</b>							<b>12.997</b>
Contingency allowance (5%)							0.649
<b>Standard time</b>							<b>13.646</b> <b>Or</b> <b>13.65</b>

**Answer: 3 13.65 standard minutes**

17. The following table shows the observed times and ratings of an operation involving five (5) elements. You are required to calculate the standard time for this operation. A contingency allowance of 5% is applicable. Work to two decimal places and indicate which one of the following is the correct answer:

Element number	Observed time	Observed rating	Frequency	Rest allowance %
1	0.66	105	2/1	12
2	1.65	80	1/1	14
3	1.51	85	2/1	15
4	0.88	75	1/1	13
5	1.21	70	1/1	12

Element number	Observed times	Observed rating	Basic time	Freq.	SBT per element	Rest allowance %	Actual time
1	0.66	115	0.759	2/1	1.518	12	1.700
2	1.65	75	1.238	1/1	1.238	14	1.411
3	1.62	80	1.296	2/1	2.592	15	2.981
4	1.86	95	1.767	1/1	1.767	13	1.997
5	1.21	85	1.029	1/1	1.029	12	1.152
<b>Total actual time</b>							<b>9.241</b>
Contingency allowance (5%)							0.462
<b>Standard time</b>							<b>9.703</b>

**Answer:** No correct choice – all students will be credited.

18. The following table shows four (4) elements. Calculate the actual time for each element and state which one of the following is correct. Work to two decimal places.

Element number	1	2	3	4
Selected basic time	0.17	0.21	0.35	0.43
Rest allowance %	5	6	7	8
<b>Actual time (in minutes)</b>	0.180	0.239	0.379	0.466
	<b>0.18</b>	<b>0.22</b>	<b>0.37</b>	<b>0.46</b>

**Answer:** 1 0.180 standard minutes

19. The following table shows the standard time calculation of a time study. A contingency allowance of 6% is applicable. Work to two decimal places. Calculate the standard time for this operation and state which of the following is the correct answer:

<b>STANDARD TIME CALCULATION</b>							
Element number	Element description	Basic time	Frequency	SBT per measurement	RA %	Other allowance	Actual time
1		0.55	1/1		15		0.63
2		0.61	1/1		14		0.70
3		0.67	1/1		16		0.78
4		0.64	1/1		14		0.73
5		0.62	1/1		15		0.71
SBT = Selected basic time RA = Rest allowance AT = Actual time				<b>TOTAL ACTUAL TIME</b>			<b>3.55</b>
				Contingency allowance 6%			0.21
				<b>STANDARD TIME</b>			<b>3.76</b>

**Answer: 2 3.76 standard minutes**

20. The following table shows the standard time calculation of a time study. A contingency allowance of 5% is applicable. Work to two decimal places.

Calculate the following:

- the total basic time per element
- the average basic time per element
- the actual time per element
- the standard time for this operation

State which of the following is the correct answer:

<b>BASIC TIME CALCULATION SHEET</b>								
		Element Number						
		NO. 1	NO. 2	NO. 3	NO. 4	NO. 5		
<b>NUMBER OF OBSERVATIONS</b>	1.	1.18	1.44	0.48	1.02	1.22		
	2.	1.10	1.48	0.39	1.05	1.25		
	3.	1.11	1.49	0.44	0.96	1.24		
	4.	1.25	1.47	0.45	0.98	1.20		
	5.	1.15	1.45	0.47	0.94	1.26		
	6.							
	7.							
	8.							
	9.							
	10.							
<b>TOTAL BASIC TIMES</b>		<b>5.79</b>	<b>7.33</b>	<b>2.23</b>	<b>4.95</b>	<b>6.17</b>		
<b>NO. OF OBSERVATIONS</b>		5	5	5	5	5		
<b>AVERAGE BASIC TIME</b>		<b>1.16</b>	<b>1.47</b>	<b>0.47</b>	<b>0.99</b>	<b>1.23</b>		
TEBS = TIME ELAPSED BEFORE STUDY TEAS = TIME ELAPSED AFTER STUDY SBT = SELECTED BASIC TIME AT = ACTUAL TIME								

STANDARD TIME CALCULATION							
Element number	Element description	Basic time	Frequency	SBT per measurement	RA %	Other allowance	Actual time
1							1.158
2							1.466
3							0.446
4							0.990
5							1.234
SBT = Selected basic time RA = Rest allowance AT = Actual time				<b>TOTAL ACTUAL TIME</b>			<b>5.294</b>
				Contingency allowance 5%			
				<b>STANDARD TIME</b>			<b>5.557</b>

**Answer: 3 5.57 standard minutes**

**SEMESTER 1: Compulsory Assignment 02: 20 questions x 1 mark = 20 marks**

Please go over the assignments in this tutorial letter. Also, ensure that you contact your lecturer if you require any other information. Always try and keep in constant contact with your lecturer.

I trust that you enjoyed studying this Work Study module.

I hope that you find these guidelines helpful. Please prepare well. Remember that I am here if you have any queries with this subject.

Kind Regards,

*Dr Barnes Sookdeo*

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