






SOLUTION TO SELF-ASSESSMENT ASSIGNMENT

QUESTION 1

Questions 1.1 and 1.2 relate to work study.

Questions 1.3 and 1.4 relate to method study.

- 1.1 Write brief notes on your understanding of the term “work study”, and explain how work study can add value to an organisation. (4)
Unit 1 Page 4-5
- 1.2 For a method study investigation to be carried out, a specific procedure must be followed. Explain the steps in the method study procedure. (7)
Unit 4 Page 67
- 1.3. Explain your understanding of the technique of method study, and state why method study is always conducted before work measurement. (4)
Unit 1 Page 8-9
- 1.4 Process chart symbols are used in the compilation of process charts during a method study investigation. Read the following descriptive statements, and name and draw the symbols for each. (5)

Description	Name of symbol	Symbol
Finished goods stored in warehouse	Storage	
Documents waiting to be filed	Delay	
Check if machine is switched off	Inspection	
Wash bottles before filling	Operation	
Walk to storage area	Transport	

- 1.5 **Process charting:** Flow process chart

The following process concerns the packaging of canned vegetables at Fresh Food (Pty) Limited. The process starts with the operator fetching empty cans from storage. The process ends with the operator positioning the packed box of cans onto a pallet to be transported to the warehouse. Compile a flow process chart.

The procedure of the flow of work being carried out is as follows:

The operator fetches cans from storage. He opens a carton of cans and inspects their quality. He picks up and positions cans into the machine. He switches on the machine. The cans travel on the conveyer belt to point (1).

Here, the cans are filled with vegetables. The cans then travel to point (2). The inspector checks if the cans are filled. The cans travel to point (3). Here, lids are fitted onto the cans. The cans then travel to point (4). Here, the cans are sealed. The cans then travel to point (5).

Here, a label is attached to the cans. The cans finally travel to the end point, where the inspector checks the quality of the cans. The operator then packs the cans into a box. The operator seals the box. He/She places the sealed box onto a pallet.

Required




















































1.5.1 Compile a flow process chart for the above procedure. Make use of the attached flow process chart to answer this question. (10)

1.5.2 Compile an outline process chart for the procedure used in 1.5.1. Make use of the attached outline process chart to answer this question. (10)

[40]

FLOW PROCESS CHART / VLOEIPROSESKAART

LOCATION / PLEK: ABC Company		6 SUMMARY / SAMEVATING			
ACTIVITY / AKTIVITEIT: Pack canned foods		EVENT / GEBEURTENIS	PRESENT / TANS	PROPOSED / VOORGESTEL	SAVINGS / BESPARING
DATE / DATUM: 15/08/2012		OPERATION / PROSES	9		
OPERATOR / OPERATEUR:	ANALYST / ONTLEDER:	TRANSPORT / VERVOER	3		
CIRCLE APPROPRIATE METHOD AND TYPE: OMKRING TOEPASLIKE METODE EN TPE : METHOD: PRESENT PROPOSED METODE : TANS : VOORGESTEL : TYPE: WORKER MATERIAL MACHINE TPE : WERKER : MATERIAAL : MASJEN:		DELAY / OPONTHOUD	1		
		STORAGE / OPBERGING			
		INSPECTION / INSPEKSIE	3		
REMARKS / OPMERKINGS: - All operations are charted		TIME / TYD (mins.)			
		DISTANCE / AFSTAND (metres)			

STEP / STAP NO.	DESCRIPTION / BESKRYWING	SYMBOL / SIMBOOL	TIME / TYD (in min)	DISTANCE / AFSTAND (in metres)	REMARKS / OPMERKINGS
1	Walk to storage area	   			
2	Checks for cans	  			
3	To packing area	  			
4	Fetches empty boxes	  			
5	Fetch tape to seal box	  			
6	Check 4 correct labels	  			
7	Labels to storage area	  			
8	Waits for cleaner	  			
9	Assembles the boxes	  			
10	Places box on table	  			
11	Packs cans into box	  			
12	Closes the box	  			
13	Seals it with tape	  			
14	Checks if label correct	  			
15	He labels the box	  			
16	Places box on pallet	  			
		  			

OUTLINE PROCESS CHART / OORSIGPROSESKAART				
DEPARTEMENT DEPARTMENT : ABC Company		STUDIE NR STUDY NO: 88/12		DATUM DATE: 15/08/2012
AFDELING DIVISION : Packing		GENEEM DEUR TAKEN BY : B. Sookdeo		
VEL SHEET : 01	VAN OF : 01			KAART BEGIN BY CHART COMMENCES AT : Walk to storage area
HUIDIGEMETHOD PRESENTMETHOD	√	VOORGESTELDE METODE PROPOSED METHOD:	KAART EINDIG BY CHART ENDS AT : Place box on pallet	
BESKRYWING VAN TAAK: DESCRIPTION OF TASK: Pack canned foods into boxes.				
WORKER: MATERIAAL: TOERUSTING / WERKER: MATERIAL: EQUIPMENT				
STEP NO.	DESCRIPTION	SYMBOL	TIME (in mins)	REMARKS
1	Checks for required cans	<input type="checkbox"/> 1		
2	Fetches empty boxes	<input type="circle"/> 1		
3	Fetches tape to seal boxes	<input type="circle"/> 2		
4	Checks for correct labels	<input type="checkbox"/> 2		
5	Assembles all the boxes	<input type="circle"/> 3		
6	Places a box on the table	<input type="circle"/> 4		
7	Packs 24 cans into box	<input type="circle"/> 5		
8	Closes the box	<input type="circle"/> 6		
9	Seals it with tape	<input type="circle"/> 7		
10	Checks if label is correct	<input type="checkbox"/> 3		
11	He labels the box	<input type="circle"/> 8		
12	Places box on pallet.	<input type="circle"/> 9		
OPSOMMING /SUMMARY	<input type="circle"/> BEWERKING OPERATION	<input type="checkbox"/> INSPEKSIE INSPECTION		TOTALE STAPPE / TOTAL STEPS
	GETAL TYD NO : 9 TIME:	GETAL TYD NO : 3 TIME:		12

QUESTION 2

Questions 2.1, 2.2, 2.3 and 2.4 relate to work measurement.

- 2.1. Work measurement is the application of techniques designed to establish the time for a qualified worker to carry out a task at a defined rate of working. In view of this statement, explain how a work measurement investigation will add value to your organisation. (5)

Unit 10 Page 245

- 2.2. To conduct a work measurement investigation, a specific procedure must be followed. Examine the basic work measurement procedure and write brief notes on your understanding of the technique work measurement. (5)

Unit 10 Page 244

- 2.3. Work measurement is concerned with investigating, reducing and subsequently eliminating inefficient time. With this in mind, distinguish between direct and indirect work measurement techniques. (6)

Unit 11 Page 263

- 2.4. **Time study:**

The following shows the observed times and ratings of an operation that was carried out at your organisation. The operation consists of 14 elements. A contingency allowance of 6% is applicable. TEAS = 0.83 and TEBS = 0.33.

You are required to calculate the standard time for this operation.

(14)

Elem.	Observed Time	Observed Rating	Average S.B.T.	Freq.	S.B.T. per element	Rest Allow. %	Actual Time per element
1	0,66	100	0.66	2/1	1.32	14	1.50
2	1,62	70	1.13	1/1	1.13	16	1.31
3	1,42	75	1.07	1/1	1.07	15	1.23
4	0,77	95	0.73	1/1	0.73	13	0.82
5	1,08	85	0.92	1/1	0.92	14	1.05
6	0,33	115	0.38	1/1	0.38	16	0.44
7	0,69	105	0.72	1/1	0.72	15	0.83
8	1,55	70	1.09	1/1	1.09	13	1.23
9	0,44	110	0.48	1/1	0.48	15	0.55
10	1,91	60	1.15	1/1	1.15	12	1.29
11	0,29	115	0.33	1/1	0.33	15	0.38
12	0,83	95	0.79	1/1	0.79	14	0.90
13	1,12	85	0.95	1/1	0.95	11	1.05
14	1,13	85	0.96	2/1	1.92	13	2.17
Total allowed time:							14.75
Contingency Allowance (6%):							0.89
Standard Time:							15.64

[30]

QUESTION 3

3.1. Process charting: Outline process chart

The following procedure concerns a motor vehicle mechanic preparing to start work.











Required:

Using the above information, compile an outline process chart (**operator type**) of the present method of the procedure outlined below. Use the attached outline process chart. (10)

OUTLINE PROCESS CHART

DEPARTEMENT DEPARTMENT : Engineering Department		STUDIE NR STUDY NO: 003/06	DATUM DATE : 15/11/2009
AFDELING DIVISION : Maintenance		GENEEM DEUR TAKEN BY : S. Tshabalala	
VEL SHEET : 01	VAN OF : 01	KAART BEGIN BY CHART COMMENCES AT : Mechanic gets out of car	
HUIDIGE METHODE PRESENT METHOD: <input checked="" type="checkbox"/>	VOORGESTELDE METODE PROPOSED METHOD:	KAART EINDIG BY CHART ENDS AT : Mechanic gets into car	
BESKRYWING VAN TAAK: DESCRIPTION OF TASK: Mechanic fetching tools			

WORKER: MATERIAAL: TOERUSTING / **WERKER:** MATERIAL: EQUIPMENT

STEP NO.	DESCRIPTION	SYMBOL	TIME (in mins)	REMARKS
1	Mechanic gets out of car	 1	0.75	
2	Unlock and enter the storeroom.	 2	0.50	
3	Picks up the toolbox	 3	0.25	
4	Checks all the tools	 1	4.50	
5	Puts aside all unwanted tools	 4	1.75	
6	Inserts selected tools into toolbox	 5	1.25	
7	Locks the storeroom.	 6	0.50	
8	Get into car.	 7	0.75	
	<i>Please ensure that you number each Symbol and also join each symbol.</i>			
OPSOMMING / SUMMARY		 BEWERKING OPERATION	 INSPEKSIE INSPECTION	TOTALE STAPPE / TOTAL STEPS
		GETAL NO : 7 TYD TIME: 5.75	GETAL NO : 1 TIME : 4.50	8

3.2. **Process charting:** Flow process chart.

The following procedure concerns the processing of a home loan application.

(10)

FLOW PROCESS CHART

DEPARTEMENT DEPARTMENT: HOME LOANS				STUDIE NR STUDY NO: 022/2006		DATUM DATE: 15/01/2009			
AFDELING DIVISION: APPLICATIONS				GENEEM DEUR TAKEN BY: S. TSHABALALA					
VEL SHEET: 01		VAN OF: 01		KAART BEGIN BY CHART COMMENCES AT: Receives the application					
HUIDIGE METODE PRESENT METHOD: <input checked="" type="checkbox"/>		VOORGESTELDE METODE PROPOSED METHOD:		KAART EINDIG BY CHART ENDS AT: Contacts the applicant					
BESKRYWING VAN TAAK DESCRIPTION OF TASK: APPLICATION FOR A HOME LOAN									
STAP NR. STEP NO.	BESONDERHEDE VAN WERK DETAILS OF OPERATION	O P E R A T I O N	I N S P E C T I O N	D E L A Y	T R A N S P O R T	S T O R A G E	DISTANCE (in metres)	TIME (in mins.)	OPMERKINGS/ REMARKS
A. The home loan consultant (HLC):									
1	Receives the application form	○	□	D	⇒	▽			
2	Checks the application	○	□	D	⇒	▽		4.30	
3	Places form in the out-tray	○	□	D	⇒	▽		0.25	
B. The credit clerk (CC):									
4	Receives the application	○	□	D	⇒	▽			
5	Contacts the credit bureau	○	□	D	⇒	▽		6.90	
6	Checks the banking details	○	□	D	⇒	▽		8.80	
7	Contacts the employer	○	□	D	⇒	▽		3.00	
8	Writes a recommendation	○	□	D	⇒	▽		2.50	
9	Takes the application to HLC	○	□	D	⇒	▽			
10	Returns to her desk	○	□	D	⇒	▽			
C. The home loan consultant (HLC):									
11	Receives the application	○	□	D	⇒	▽			
12	Checks the recommendation	○	□	D	⇒	▽		1.50	
13	Contacts the applicant	○	□	D	⇒	▽		3.75	
OPSOMMING/ SUMMARY		▽ STORAGE OPBERGING	○ OPERATION OPERASIE	⇒ TRANSPORT	D DELAY	□ INSPECTION INSEKSIE			
GETAL / NUMBER:		8		2		3			
TYD / TIME:		16.40 minutes		30 metres		14.60 minutes			

3.3. The following observed times were taken from a time study that was conducted in the production department of your organisation. The task consists of five elements, and five observations of each element were made. The study started at 08:30 and finished at 09:10. A contingency allowance of 6% is applicable.

Element number	Observed time	Rating	Basic time
1	1.40	80	1.12
2	2.35	65	1.53
3	0.64	75	0.48
4	1.30	80	1.04
5	1.58	80	1.26
1	1.42	85	1.21
2	2.26	70	1.58
3	0.56	70	0.39
4	1.20	85	1.02
5	1.56	85	1.33
1	1.40	85	1.19
2	2.28	70	1.60
3	0.62	75	0.47
4	1.32	75	0.99
5	1.60	80	1.28
1	1.42	85	1.21
2	2.32	70	1.62
3	0.67	80	0.54
4	1.26	80	1.01
5	1.48	85	1.26
1	1.33	80	1.06
2	2.44	65	1.59
3	0.68	80	0.54
4	1.34	70	0.94
5	1.60	85	1.36

		E l e m e n t N u m b e r									
		NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10
NUMBER OF OBSERVATIONS	1.	1.12	1.53	0.48	1.04	1.26					
	2.	1.21	1.58	0.39	1.02	1.33					
	3.	1.19	1.60	0.47	0.99	1.28					
	4.	1.21	1.62	0.54	1.01	1.26					
	5.	1.06	1.59	0.54	0.94	1.36					
	6.										
	7.										
	8.										
	9.										
	10.										
	11.										
	12.										
	13.										
	14.										
	15.										
TOTALS:		5.79	7.92	2.42	5.00	6.49					
NO. OF OBSERVATIONS:		5	5	5	5	5					
AVERAGE BASIC TIME		1.16	1.58	0.48	1.00	1.30					
TEBS = TIME ELAPSED BEFORE STUDY						TEAS = TIME ELAPSED AFTER STUDY					
SBT = SELECTED BASIC TIME						AT = ACTUAL TIME					

Error margin:

$$= \frac{\text{Clock time} - \text{All observed times}}{\text{Clock time}} \times 100$$

$$= \frac{40 \text{ minutes} - (36.03 + 2.00 + 1.35)}{40 \text{ minutes}} \times 100$$

$$= \frac{40 \text{ minutes} - (36.03 + 2.00 + 1.35)}{40 \text{ minutes}} \times 100$$

$$= \frac{40 \text{ minutes} - (36.03 + 2.00 + 1.35)}{40 \text{ minutes}} \times 100$$

$$= \underline{\underline{1.55\%}}$$

Error limit is less than 2%, therefore the study is acceptable.

STANDARD TIME CALCULATION							
Elem No.	Element Description	Basic Time	Frequency	SBT per measurement	RA %	Other Allowances	Actual Time
1		1.16	1/1	1.16	12		1.22
2		1.58	1/1	1.58	11		1.23
3		0.48	1/1	0.48	12		1.23
4		1.00	1/1	1.00	10		1.24
5		1.30	1/1	1.30	13		1.24
V B T – Verteenwoordigende Basiese Tyd S B T – Selected Basic Time				TOTAL ALLOWED TIME:			6.16
KR - Kompenserende Rustoelating R A - Rest Allowances				Contingency allowance: 6%			0.37
TT – Toegelate Tyd AT – Allowed Time				STANDARD TIME:			6.53

3.4. The information below concerns the manufacturing of one-litre plastic containers. A total of five plastic containers were manufactured. Only one operator was utilised during this process, and the process consisted of five elements.

Element number		Observation number				
		1	2	3	4	5
1	Rating	60	70	75	80	85
	Observed time	3.82	3.41	3.38	3.28	3.79
		2.29	2.39	2.54	2.62	3.22
2	Rating	85	70	75	60	80
	Observed time	3.80	3.55	3.25	3.50	3.96
		3.23	2.49	2.44	2.10	3.17
3	Rating	70	75	65	80	60
	Observed time	2.28	2.54	2.39	2.69	2.85
		1.60	1.91	1.55	2.15	1.71
4	Rating	80	75	70	85	80
	Observed time	3.65	3.60	3.78	3.68	3.82
		2.92	2.70	2.65	3.13	3.06
5	Rating	100	95	100	90	95
	Observed time	1.21	1.12	1.23	1.25	1.22
		1.21	1.06	1.23	1.13	1.16

TIME STUDY ANALYSIS SHEET

DEPARTMENT:					STUDY TAKEN BY:						
DIVISION:					DATE:			STUDY NO:			
DESCRIPTION OF TASK:					TIME FINISHED:			TEBS + TEAS:			
					TIME STARTED:			TIME OF STUDY:			
WORKER:		ERROR:			ELAPSED TIME:			RECORDED TIME:			
Basic time per element											
		E L E M E N T N U M B E R									
		NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10
N U M B E R O F O B S E R V A T I	1.	2.29	3.23	1.60	2.92	1.21					
	2.	2.39	2.49	1.91	2.70	1.06					
	3.	2.54	2.44	1.55	2.65	1.23					
	4.	2.62	2.10	2.15	3.13	1.13					
	5.	3.22	3.17	1.71	3.06	1.16					
	6.										
	7.										
	8.										
	9.										
	10.										
	11.										
	12.										
	13.										
	14.										
	15.										
TOTALS:		13.06	13.43	8.92	14.46	5.79					
NO. OF OBSERVATIONS:		5	5	5	5	5					
AVERAGE BASIC TIME:		2.61	2.69	1.78	2.89	1.16					
TEBS = TIME ELAPSED BEFORE STUDY TEAS = TIME ELAPSED AFTER STUDY SBT = SELECTED BASIC TIME AT = ACTUAL TIME											

STANDARD TIME CALCULATION							
Elem No.	Element Description	Basic Time	Frequency	SBT per measurement	RA %	Other Allowances	Actual Time
1		2.61	1/1	2.61	14		2.98
2		2.69	1/1	2.69	15		3.09
3		1.78	1/1	1.78	10		1.96
4		2.89	1/1	2.89	12		3.24
5		1.16	1/1	1.16	10		1.28
V B T – Verteenvoordigende Basiese Tyd S B T – Selected Basic Time				TOTAL ALLOWED TIME:			12.55
KR - Kompenserende Rustoelating R A - Rest Allowances				Contingency allowance: 6%			0.75
TT – Toegelate Tyd AT – Allowed Time				STANDARD TIME:			13.30

(15)

- 3.5. Below is a time study sheet of an operation that was conducted at your organisation. It involves the sewing of towels, and consists of 5 elements. A total of 8 observations were made. The observed times and ratings of the operation, as well as occasional elements, are provided. The study started at 10:00 and finished at 11:10.
TEAS = 0.73 and TEBS = 0.79

(15)

Required:

Calculate the standard time for the sewing of one towel. A contingency allowance of 6% is applicable.

Note: Ignore occasional elements.

TIME STUDY OBSERVATION SHEET

STUDY NO.: 134/2014				DATE: 28 February 2014			
TAKEN BY: JM MICHAELS				SHEET NO.: 03		OF: 6	
STUDY COMMENCES:				Start time: 10:00		Finish: 11:10	
STUDY ENDS:							
DESCRIPTION OF TASK: Sewing towels						Error margin:	
ELEMENT DESCRIPTION	Observed time	Rating	Basic time	ELEMENT DESCRIPTION	Observed time	Rating	Basic time
<i>Spoke to supervisor: Jabu</i>				<i>Temperature: Hot and humid</i>			
1. Pick up towel	1.34	80	1.07	1.	1.25	75	0.94
2. Fold & insert in m/c	2.39	65	1.55	2.	2.38	70	1.67
3. Run m/c: Sew towel	0.62	75	0.47	3.	0.61	70	0.43
4. Remove from m/c	1.26	80	1.01	4.	1.19	85	1.01
5. Aside for inspection	1.54	80	1.23	5.	1.59	70	1.11
				<i>Operator: Rest break</i>			
1.	1.40	85	1.19	1.	1.31	80	1.05
2.	2.29	70	1.60	2.	2.31	75	1.73
3.	0.59	70	0.41	3.	0.60	75	0.45
4.	1.19	85	1.01	4.	1.27	85	1.08
5.	1.49	85	1.27	5.	1.56	80	1.25
<i>Ineffective time</i>							
				1.			
1.	1.39	85	1.18	2.	1.38	85	1.17
2.	2.33	70	1.63	3.	2.32	70	1.62
3.	0.61	75	0.46	4.	0.66	70	0.46
4.	1.29	75	0.97	5.	1.25	80	1.00
5.	1.58	75	1.19	<i>Wait for needle</i>			
				1.			
1.	1.42	85	1.21	2.	1.40	85	1.19
2.	2.39	70	1.67	3.	2.29	70	1.60
3.	0.69	80	0.55	4.	0.59	70	0.41
4.	1.19	85	1.01	5.	1.19	85	1.01
<i>Idle time</i>				5.			
4.	0.35			1.49			
4.	1.24	80	0.99	<i>Operator cooperated</i>			
5.	1.44	75	1.08	<i>well with me.</i>			
				<i>Raw materials were</i>			
				<i>delivered on time.</i>			

[60]

TOTAL = 120 MARKS

TIME STUDY ANALYSIS SHEET

DEPARTMENT:					STUDY TAKEN BY:						
DIVISION:					DATE:			STUDY NO:			
DESCRIPTION OF TASK:					TIME FINISHED:			TEBS + TEAS:			
					TIME STARTED:			TIME OF STUDY:			
WORKER:			ERROR:		ELAPSED TIME:			RECORDED TIME:			
Basic time per element											
		E L E M E N T N U M B E R									
		NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10
N U M B E R O F O B S E R V A T I	1.	1.07	1.55	0.47	1.01	1.23					
	2.	1.19	1.60	0.41	1.01	1.28					
	3.	1.18	1.63	0.46	0.97	1.19					
	4.	1.21	1.67	0.55	0.99	1.08					
	5.	0.94	1.67	0.43	1.01	1.11					
	6.	1.05	1.73	0.45	1.08	1.25					
	7.	1.17	1.62	0.46	1.00	1.12					
	8.	1.19	1.60	0.41	1.01	1.27					
	9.										
	10.										
	11.										
	12.										
	13.										
	14.										
	15.										
TOTALS:		9.00	13.07	3.64	8.08	9.53					
NO. OF OBSERVATIONS:		8	8	8	8	8					
AVERAGE BASIC TIME:		1.13	1.63	0.46	1.01	1.19					
TEBS = TIME ELAPSED BEFORE STUDY		TEAS =		TIME ELAPSED AFTER STUDY							
SBT = SELECTED BASIC TIME		AT =		ACTUAL TIME							

STANDARD TIME CALCULATION							
Elem No.	Element Description	Basic Time	Frequency	SBT per measurement	RA %	Other Allowances	Actual Time
1		1.13	1/1	1.13	0		1.13
2		1.63	1/1	1.63	0		1.63
3		0.46	1/1	0.46	0		0.46
4		1.01	1/1	1.01	0		1.01
5		1.19	1/1	1.19	0		1.19
V B T – Verteenwoordigende Basiese Tyd S B T – Selected Basic Time KR - Kompenserende Rustoelating R A - Rest Allowances TT – Toegelate Tyd AT – Allowed Time				TOTAL ALLOWED TIME:			5.42
				Contingency allowance: 6%			0.33
				STANDARD TIME:			5.75