UNIVERSITY OF JOHANNESBURG

PROGRAM	: NATIONAL DIPLOMA *INDUSTRIAL ENGINEERING TECHNOLOGY*
SUBJECT	: **WORK STUDY I**
CODE	: **TIV 121**
DATE	: SUPPLEMENTARY EXAMINATION 11 JANUARY 2017
WEIGHT	: 40:60
DURATION	: (SESSION 1) 08:00 – 11:00
TOTAL MARKS	: 100

EXAMINER	: Y.N. MAROWA
MODERATOR	: H. STEENKAMP
NUMBER OF PAGES	: 4 PAGES

INSTRUCTIONS

1. ANSWER ALL THE QUESTIONS.
2. NUMBER YOUR ANSWERS ACCORDING TO THE QUESTION PAPER.
3. ONE CALCULATOR PERMITTED PER STUDENT.

QUESTION 1

Read the following Case study:

Eddie works on an engine assembly line. He uses a handheld impact wrench to fit a component to an engine. The assembly line makes up to 2400 engines a day and it takes approximately 3 seconds to tighten each component. As well as the risk from using a vibrating tool, Eddie often had to adopt poor postures to reach some parts of the engine. He had to repeatedly stretch out his arm and constrain his posture while tightening the adapter. After a few weeks Eddie found that he was leaving work with shoulder and neck pain. One tea break, Eddie's line manager saw him rubbing his neck and shoulder and recognized that the pain could be due to the type of work Eddie was doing. The line manager spoke with Eddie and then told the company health and safety officer about what he had seen. The company assessed the work by considering ergonomics principles.

1.1 Briefly discuss the task for ergonomics from any point of view. (5)
1.2 How can you improve Eddie's poor working postures? (2)
1.3 What are the benefits of using ergonomics in the workplace? (8)

[15]

QUESTION 2

At Dorbean Company, an Industrial Analyst gathered data on the number of complaints from customers. The table below shows the complaints and the annual costs.

Customer complaints	Annual Rand Cost
Stain	7820
Finish	9852
Incorrect dimensions	25000
Lubrication	6000
Gears	35000
Wrong design	55000

2.1 Based upon the above data, draw a pareto diagram and a pareto curve. (10)
2.2 Which complaint has the highest annual cost, what advise could you give to the management. (2)

[12]

QUESTION 3

Eskom's customer call center decided to do a cause and effect analysis to improve their business. An average of 1000 customers calls this center every day. Surveys indicated that the callers tended to become irritated if the phone rang more than 5 times. Customer satisfaction is one of the key performance indicators for the call centre. The staff first discussed why the current process made customers wait. They found that sometimes there was not enough staff, sometimes there are telephone call rush such as lunch time. The operator has to access the customers data on the system, sometimes there are system failure or the data is inaccurate and

more time is spend on sorting the data. There was a high turnover in the call center of staff and this lead to inexperienced staff that need to learn the processes and are slower than experienced staff. Some customers have lengthy discussions with the operators. Often customers ask for directions to the branch.

3.1 Draw a well labeled cause and effect diagram for the above case study. (12)
3.2 Discuss possible solutions to the addressed issues. (4)
[16]

QUESTION 4

A time study was conducted on a plug assembly. The following data was recorded:

a. Contingency allowance is 10%.
b. Process allowance is 7%.

Element number	Element 1	Element 2	Element 3	Element 4	Element 5
Rating factor	105	120	110	80	90
Rest allowance	7%	10%	8%	4%	5%
Reading 1	46.2	42.0	45.1	58.3	56.5
Reading 2	57.6	23.1	53.5	60.1	57.3
Reading 3	45.4	28.8	25.2	68.5	60.4
Reading 4	42.7	30.7	34.7	51.9	48.9
Reading 5	64.2	33.9	40.8	68.3	65.6

4.1 Calculate the representative basic time for each element. (10)
4.2 Calculate the total work content for the process. (10
4.3 Calculate standard time for the process. (2)
4.4 Calculate the allowed time. (2)
[24]

QUESTION 5

Draw a single column process chart for the following process of processing expense reports. The expense report arrives at accounts payable desk, where it waits to be processed. The report is checked and the clerk then stamps and dates the report. Cash is then sent to the receipt desk and waits to be processed. The clerk checks to see if an advance payment has been made and then it is sent to the accounts receivable desk, where it waits for processing. The employee's past account is then checked and it is then sent to the accounts payable desk. A payment voucher is then attached to the report. The report is logged. Items are checked against company guidelines. They then wait for batching. The reports are collected in a batch. The batch goes to the audit desk where it waits for processing. The batch of reports is logged. Payment vouchers are checked and the reports go to batch control. A control number is then applied to the batch. Copies of the reports go to filing. Copies of the payment vouchers go to the keyboard and then a cheque is made out. (28)

[28]

QUESTION 6

An analyst took observations for 12 days and found that the worker is busy 85% of the time. Using the statistical method, determine the sample size needed to achieve a 95% confidence level with a 10% margin of error. (5)

[5]

TOTAL MARKS: 100