NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF TECHNICAL AND ENGINEERING EDUCATION AND TRAINING

MAINTENANCE ENGINEERING

PTE 4248

Main Examination

May 2018

This examination paper consists of 3 pages

Time allowed: 3 hours

Total marks: 100

Examiner's name: Eng. G Munhuwamambo

INSTRUCTIONS

1. Answer any **FIVE** questions out of **SEVEN**.
2. Each question carries **20 marks**.
3. Show all working
4. There are three **(3)** printed pages.
5. Use of calculator is allowed

QUESTION ONE

Distinguish between any 4 types of maintenance strategies sighting advantages and disadvantages of each. **[20]**

QUESTION TWO

a) Draw the equipment life cycle curve and discuss the various phases in it. **[6]**

b) As a Maintenance Engineer, write a report to management on how an effective maintenance management system can be developed, outlining the resources you would need at each stage.

[14]

QUESTION THREE

a) Define maintenance **[2]**

b) Explain the role of maintenance engineering in an organisation as it thrives to achieve its organisational goals **[7]**

c) Differentiate maintenance and maintenance engineering **[4]**

d) What are the benefits of a good maintenance management system in an organisation **[7]**

QUESTION FOUR

a) Define Total Productive Maintenance (TPM) **[4]**

b) Describe the 8 pillars of Total Productive Maintenance **[16]**

QUESTION FIVE

a) Define a plant register **[2]**

b) Identify 4 benefits of a good plant register **[4]**

c) Describe briefly , any two methods used to record assets **[4]**

d) What is inventory **[3]**

e) How does a well-documented inventory system improve the maintenance function of a production organisation **[4]**

f) Briefly explain the ABC analysis using suitable mathematical models **[3]**

QUESTION SIX

Briefly explain the following terms and abbreviations as applied in maintenance management

a) MTTF **[2]**
b) MTBF **[2]**
c) MTTR **[2]**
d) Availability **[3]**
e) Reliability **[3]**
f) Maintainability **[3]**

g) A company puts 50 units on test and run at their normal operating conditions for 1000 hours. Six units are found to fail after the following hours 550, 480, 680, 790, 860 and 620.

c) Calculate the percentage failure rate of the product **[2]**
d) Calculate the failure rate per hour. **[3]**

QUESTION SEVEN

(a) Distinguish between repairs and replacements in maintenance engineering **[2]**

(b) The Bulawayo City Council has 7 000 solar street lights in the city, the Maintenance Engineer has recorded the failure rates as shown in Table Q3.

Table Q4: Recorded failure rates

Year	**1**	**2**	**3**	**4**	**5**
% failing at end of the year	10	25	50	80	100

The Maintenance Contractor charges $100.00 to replace an individual bulb on failure and $40.00 per bulb when replacing all the bulbs at the same time. It is under proposal to replace all bulbs at fixed intervals of time, whether or not the bulbs have burnt out, or to replace immediately burnt out bulbs.

(i) Determine and justify the time interval at which all the bulbs should be replaced? \ **[15]**

(ii) Suggest possible reasons why the Maintenance Contractor charges more to replace individual bulbs than all the bulbs.

[3]

g)