



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

**UNIVERSITY EXAMINATION FOR:**

**BACHELOR OF SCIENCE IN MECHANICAL & AUTOMOTIVE  
ENGINEERING**

**EMG 2519 : MAINTENANCE ENGINEERING & INDUSTRIAL SAFETY**

**(PAPER 1)**

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2016**

**TIME: 2 HOURS**

**DATE:** Pick Date Dec 2016

## **Instructions to Candidates**

You should have the following for this examination

*-Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

**Do not write on the question paper.**

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## **Question ONE**

- (a) List 4 main factors that offer challenges to maintenance. (4 marks)
- (b) Outline 4 objectives of maintenance engineering. (4 marks)
- (c) Briefly discuss the following forms of maintenance: (6 marks)
- i. Preventative,
  - ii. Corrective,
  - iii. Predictive.
- (d) Explain the following terms as used in maintenance engineering: (6 marks)
- i. Reliability,
  - ii. Maintainability,
  - iii. Overhaul.

## Question TWO

- (a) Briefly discuss the following mechanisms in relation to ageing of assets: (10 marks)
- i. Corrosion,
  - ii. Stress corrosion cracking (SCC)
  - iii. Fatigue,
  - iv. Erosion,
  - v. High temperature deterioration.
- (b) Outline 4 processes involved in corrosion management. (4 marks)
- (c) Discuss the following influences and their contribution towards deterioration of assets. (6 marks)
- i. Design Influence.
  - ii. Fabrication or Construction Influences.
  - iii. Operation Influences.

## Question THREE

- (a) Differentiate reliability from availability. (4 marks)
- (b) List any 4 factors that can be implemented to improve productivity. (4 marks)
- (c) With the aid of a well labeled diagram, discuss the concept of the “bathtub curve” with regard to reliability analysis. (6 marks)
- (d) Historically, an equipment has 4 failures per year. What is the reliability of this equipment for a 100 days run? (3 marks)

Assuming some upgrades have been made, so failure rate now is 2 per year (meaning that Mean Time Between Failure has doubled). What is the reliability for a 100 days run? (3 marks)

## Question FOUR

- (a) Outline any 5 factors that affect sustainability of assets. (5 marks)
- (b) Discuss the concepts behind: (6 marks)
- i. Failure based maintenance
  - ii. Use based maintenance.
  - iii. Condition based maintenance.
- (c) Briefly discuss 4 roles of an employer with regard to OSHA. (4 marks)
- (d) List the 5 different types of inspections that may be undertaken by OSHA agents. (5 marks)

## Question FIVE

- (a) Discuss the following concepts with regard to accidents prevention: (6 marks)
- i. Primary prevention,
  - ii. Secondary prevention,
  - iii. Tertiary prevention.
- (b) Outline three important factors that an engineer should be aware of in order to prevent occurrence of accidents resulting from fires and explosions. (3 marks)
- (c) With the aid of a well labeled diagram, illustrate the “fire triangle”. (6 marks)
- (d) Identify 3 types of fires and recommend the types of fire extinguishers that can be used to control them. (5 marks)