



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology
Department of Mechanical & Automotive Engineering
UNIVERSITY EXAMINATION FOR:
BSc. Mechanical Engineering
EMG 2519 : Maintenance Engineering & Industrial Safety (Paper 2)
SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
TIME: 2 HOURS
DATE: Pick Date Sep 2018

Instruction to Candidates:

You should have the following for this examination

- *Answer booklet*
- *Non-Programmable scientific calculator*

This paper consists of **FIVE** questions. Attempt question **ONE** and any other **TWO** questions.

Maximum marks for each part of a question are as shown.

Do not write on the question paper.

Question ONE

- a) Define maintenance. (2 marks)
- b) Discuss 4 critical success factors that can be positively influenced by effective asset maintenance. (6 marks)
- c) Briefly discuss the 3 main forms of maintenance. (6 marks)
- d) Explain the following terms as used in maintenance engineering: (6 marks)
- Quality,
 - Maintenance concept,
 - Inspection.

Question TWO

- a) Define ageing in relation to equipment. (2 marks)
- b) Differentiate deterioration from failure with regard to ageing of equipment. (4 marks)
- c) Briefly discuss 4 factors related to equipment that are affected by deterioration. (8 marks)
- d) Explain the following mechanisms of corrosion: (6 marks)

- i. General corrosion.
- ii. Localized corrosion.
- iii. Velocity related corrosion attack.

Question THREE

- a) Differentiate failure density from hazard rate. (4 marks)
- b) In relation to MTBM (Mean Time between Maintenance actions) and M (Maintenance Mean down Time), list 4 ways to improve asset availability. (4 marks)
- c) With regard to reliability analysis, discuss the 3 main stages of an equipment bathtub curve. (6 marks)
- d) Historically, an equipment has a MTBF = 200 days. To improve 10% its reliability to operate on a 100 days run, what percent should MTBF be improved? (6 marks)

Question FOUR

- a) Outline the 3 basic conditions needed to ensure successful maintenance of assets. (3 marks)
- b) Discuss the concepts behind: (6 marks)
 - i. Failure based maintenance
 - ii. Use based maintenance.
 - iii. Condition based maintenance.
- c) Briefly discuss 6 rights of an employee with regard to OSHA. (6 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)