



(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

(Main Campus)

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

EXAMINATION

THIRD YEAR SECOND SEMESTER EXAMINATION

FOR THE DEGREE OF

**BACHELOR OF SCIENCE IN DISASTER PREPAREDNESS & ENGINEERING
MANAGEMENT**

COURSE CODE: DPE 308

COURSE TITLE: PROCESS AND SYSTEM SAFETY ENGINEERING

DATE: 01/08/2022

TIME: 8 -10 AM

Instructions to Candidates

- This paper contains **FOUR (4)** questions
- Answer **ALL** questions in Section A and **ANY TWO** in Section B

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 2 Printed Pages. Please Turn Over →

SECTION A: Answer ALL questions [30 Marks]

Question ONE

- a) Differentiate:
- i) Qualitative and quantitative system analysis techniques [3 Marks]
 - ii) Failure mode and effects analysis (FMEA) and Fault tree analysis (FTA) [3 Marks]
 - iii) OR gate and Exclusive OR gate in system analysis [3 Marks]
 - iv) Basic event and External event [3 Marks]
- b) List and describe FIVE steps involved in a Fault tree analysis. [10 Marks]
- c) List and explain two categories of techniques to reduce the probability of system failure. [4 Marks]
- d) In relation to process and system safety engineering, describe the following:
- i) Priority AND gate [1 Mark]
 - ii) Inhibit gate [1 Mark]
 - iii) Transfer in and transfer out symbols [1 Mark]
 - iv) Conditioning event [1 Mark]

SECTION B: Answer ANY TWO questions [40 Marks]

Question TWO

- a) List and describe TEN factors that are important in industrial fire protection in system.
- b) Describe the importance of human/ergonomic factors in system safety management.

[10 marks]

Question THREE

With aid of sketches state and prove with equations the three rules of Boolean simplification in system process. [20 marks]

Question FOUR

- a) With an aid of a sketch, describe safety analysis process. [10 marks]
- b) With an aid of a sketch describe risk vs cost/complexity in system analysis. [10 marks]