

## TECHNICAL UNIVERSITY OF MOMBASA

# **Faculty of Engineering and Technology**

# **Department of Mechanical & Automotive Engineering**

### UNIVERSITY EXAMINATION FOR 2015/2016

**Bachelor of Science in Mechanical Engineering** 

# EMG 2519: MAINTENANCE ENGINEERING AND

## **INDUSTRIAL SAFETY**

END OF SEMESTER EXAMINATION

**SERIES: MAY 2015/2016** 

TIME: 2 HOURS

**DATE: MAY 2016** 

#### **Instructions to Candidates**

- 1. You should have the following for this examination
  - *Answer Booklet*,
  - Examination pass and student ID
  - Non –programmable calculator
  - Drawing Instruments
- 2. This paper consists of **FIVE** questions.
- 3. Answer Question one is **COMPULSORY** and any other **TWO** Questions
- 4. All symbols have their usual meanings.
- 5. All relevant tables and formulae have provided on the question paper
- 6. This paper consist of **THREE** printed pages
- 7. Do not write on the question paper.

#### **Question ONE (30mks)**

- i. Define the following terms:
  - a. Ergonomics
  - b. Near miss
  - c. Accident
  - d. Welfare
  - e. Safety policy (5 mks)
- ii. Explain giving an example in each case the circumstance under which health and safety inspector may serve an improvement notices and prohibition notices(4mks)
- iii. State two electrical hazard in a beverage manufacturing industries and atleast two controls needed to be in place (3mks)
- iv. The OSH act 2007 act sets out some requirements on fittings and attachment that should be affixed to boilers and steam receivers. Describe FOUR such mandatory requirements (4mks)
- v. Differentiate between Hazard and a risk giving examples in each case (4mks)

h.

- i. Explain the following terms
  - a) Maintainability
  - b) Reliability
  - c) Availability (6mks)
- ii. State atleast three advantages of planning and scheduling (3mks)
- iii. What are the roles of fire detection and alarm systems (1mks)

#### Question TWO (20mks)

- a. During a routine visit, a health and safety enforcement officer has discovered an unguarded lift shaft left by a contractor, whilst working on employers premises
  - i. State at least four power given to the enforcement officer under OSHA2007 act(4mks)
  - ii. Discuss the duties of the following people in workplaces
    - i. Occupiers
    - ii. Employees (10mks)
- b. Outline ways in which employers may motivate their employees to comply with health and safety procedures (6mks)

#### **Question THREE (20mks)**

a.

- i. Define the term TPM (2mks)
- ii. State the 5S philosophy of TPM(5mks)
- iii. State atleast three benefits of TPM(3mks)
- b. Describe with aid of diagram the bath tub curve model depicting clearly the three periods of failures of equipments (6mks)
- c. The time to repair a component is best described by the following probability density function:

$$h(t) = 0.083333t$$
, with  $1 \le t \le 5hr$ ,

#### Determine

- i. The probability of completing repairs in 3 hours
- ii. MTTR (4mks)

#### **Question FOUR (20mks)**

- a. Outline Atleast FOUR particles which are boldly marked on every cylinder under occupational safety and health act (8mks)
- b. Describe atleast two requirements on ergonomics at the workplace as defined by the OSH 2007 act (2mks)
- c. Discuss the framework and components of health and safety management with a schematic flowchart (10mks)

#### **Ouestion FIVE**

- a. Define the following terms
  - i. flash point
  - ii. fire point
  - iii. ignition temperature(3mks)
- b. State atleast two causes of accidents in industries? (2mks)
- c. State TWO methods of fire extinction / methods of attack (2mks)
- d. State TWO advantages of using water as fire extinguishers (2mks)
- e. What are effects of fire hazards (2mks)
- f. Outline various key aspects of fire protection based on structural fire protection and early fire detection(alarm and fire detections units) (9mks)

\*The End\*