

FINAL EXAMINATION SEMESTER II SESSION 2023/2024

| COURSE CODE | : | METE1153 |
|-------------|---|---------------------------------------|
| COURSE | : | OCCUPATIONAL SAFETY FOR ENERGY SYSTEM |
| PROGRAMME | : | MASTER OF SCIENCE (ENERGY MANAGEMENT) |
| TIME | : | 9.00 AM – 12 PM |
| DATE | : | 21 st JULY 2024 |

INSTRUCTIONS TO STUDENT:

- 1. ANSWER ALL QUESTIONS
- 2. STUDENTS ARE NOT ALLOWED TO REFER TO ANY NOTES OR ELECTRONIC DEVICES

QUESTION 1 (25 Marks)

| PLO | PLO1 | | | |
|-------|------|-----|-----|------|
| CLO | CLO1 | | | CLO2 |
| | (a) | (b) | (c) | (d) |
| Marks | 5 | 5 | 5 | 10 |

- (a) Discuss what are the significant differences between occupational safety and process safety?
 (5 Marks)
- (b) Identify five (5) possible electrical accidents that could potentially take place in an electrical room. (5 Marks)
- (c) Propose the personal protective equipment (PPE) that are required to be applied by a chargeman in an electrical substation. (5 Marks)
- (d) Discuss critically a past major industrial accident that has taken place in Bhopal, India that has resulted in a casualty of more than 20,000 people; and affected the health of 500,000 people. Analyse the level of safety for the particular company involved in this disastrous incident. Provide suggestions to avoid similar accidents from recurring. (10 Marks)

QUESTION 2 (25 Marks)

| PLO | PLO2 |
|-------|------|
| CLO | CLO3 |
| Marks | 25 |

As a specialized engineer focusing on energy management in your company, you were instructed to establish a more sustainable energy system without compromising safety. However, before you can proceed, you were reminded to refer to various guides, standards, regulations and/or act so that your proposal will be legally acceptable. Evaluate the minimum of five (5) guides, standards, regulations and/or act that are related to energy system and safety that will uplift your company to be a more sustainable energy system practitioner. (25 Marks)

QUESTION 3 (25 Marks)

| PLO | PL | 08 |
|-------|------|-----|
| CLO | CLO4 | |
| Marks | (a) | (b) |
| | 10 | 15 |

Purnama Oleo Sdn. Bhd. consumed substantial electrical power supplied by Tenaga National Berhad (TNB). The company plans to generate the electricity from palm oil empty fruit bunch EFB as shown in **Figure 1**. The electrical engineers was assigned by the management to conduct HAZOP study and analysis for the power generation plant. Unfortunately, the electrical engineer is not well verse on HAZOP.



Figure 1: Proposed palm oil waste co-generation system

- a) Prepare a detail guide on the concept of HAZOP for a training you are supposed to deliver to the electrical engineer and their team in Purnama Oleo Sdn. Bhd. (10 Marks)
- b) Conduct a detailed and comprehensive HAZOP on a minimum of two (2) guidewords on what could take place in the boiler, turbine and receiver. Tabulate your result in a proper HAZOP table.
 (15 Marks)

QUESTION 4 (25 Marks)

| PLO | PLO11 |
|-------|-------|
| CLO | CLO5 |
| Marks | 25 |

Creatifusion Energy is a new utility provider wishing to serve the companies around its vicinity by supplying power (electricity) which they generate from their newly established co-generation plant. However, several prospectus companies have given condition that Creatifusion Energy must fulfill safety quality standard, before they signed contract to purchase power. As a reputable safety consultant, Creatifusion Energy has invited you to help them establish a proper safety management system (SMS), that is part of the safety quality standard requirement. Design a detailed SMS framework, complete with the required elements for Creatifusion Energy.

(25 Marks)