

# Uganda Martyrs University

## Faculty of Science

Course: Science, Technology and Ethics

Year of Study: 3; 2022-2023

Semester II

Final Assessment

Date: 26<sup>th</sup> May 2023

Time: 9:30 – 12:30 p.m.

### Instructions

- Answer any two (2) questions in Section A, and one (1) question in Section B.
- You must ANSWER THREE (3) QUESTIONS IN ALL.
- Endeavor to write in clear and grammatically correct English.

### SECTION A: ANSWER ANY TWO (2) QUESTIONS IN THIS SECTION [60 MARKS]

#### Question 1 [30 marks]

- a. Define "Science" and explain the key elements that characterize the Scientific Method. (15 marks)
- b. Explain some key limitations that a scientist without the study of ethics would have. (15 marks)

#### Question 2 [30 marks]

- a. Define "Artificial Intelligence" and explain at least three different types of Artificial Intelligence that you know. (8 marks)
- b. List and briefly discuss the benefits and limitations of Artificial Intelligence. (8 marks)
- c. Discuss, with relevant examples, the key ethical problems that are posed by Artificial Intelligence. (14 marks)

#### Question 3 [30 marks]

There are many challenges that everybody working with computers connected to internet is likely to face.

- b. From test
- a. Define the following and explain the difficulties/dangers they pose in cyberspace:
    - i. Data mining (4 marks)
    - ii. Hacking (4 marks)
    - iii. Cyber-stalking (4 marks)
  - b. How best, as someone with a good knowledge of information technology and ethics, would you deal with the above difficulties? (18 marks)

**Question 4 [30 marks]**

James H. Moor, in a seminal article, "Computer Ethics" has examined the reality of cybernetic organisms (cyborgs) and ethical challenges they are likely to raise.

- a. Define a "cyborg" and, with an example, explain its key characteristics. (8 marks)
- b. Discuss the benefits of developing cyborgs? (12 marks)
- c. Using your knowledge of ethics, discuss the ethical challenges that cyborgs are likely to present. (12 marks)

**SECTION B: ANSWER ONE (1) QUESTION IN THIS SECTION [40 MARKS]**

**Question 5 (40 marks)**

- a. Discuss the relationship between "Technology" and "Science". Provide two examples to demonstrate this relationship. (8 marks)
- b. Describe any three very recent (20<sup>th</sup> and 21<sup>st</sup> century) forms of technology; demonstrate their use and benefits. (12 marks)
- c. Discuss three important challenges that Pope Francis recently, on 20<sup>th</sup> Feb. 2023, presented at a meeting with the *Pontifical Academy for Life* on the relationship between the person, emerging technologies and the common good. (20 marks)

**Question 6 [40 marks]**

In 2020 the European Research Service conducted a study entitled: *The Ethics of Artificial Intelligence: Issues and Initiatives*, in which it critically examined the ethical implications and moral questions that arise from the development of Artificial Intelligence (AI) technologies. From your study of this document:

- a. Explain, with an example, what is meant by:
  - i. Software-based systems acting in the virtual world (4marks)
  - ii. Hardware-embedded systems (4 marks)
  - iii. Machine Learning (4 marks)
  - iv. Deep Learning (4 marks)

b. From an ethical/moral point of view, discuss the impact (positive and negative) of AI technologies on society, particularly in the following areas:

- i. The Labor market **(6 marks)**
- ii. Human psychology **(6 marks)**
- iii. The Environment **(6 marks)**
- iv. Trust **(6 marks)**