

## INDUSTRIAL SUSTAINABILITY

### 22WSD602

Semester 2 2023

In-Person Exam paper

This examination is to take place in-person at a central University venue under exam conditions. The standard length of time for this paper is **2 hours**.

You will not be able to leave the exam hall for the first 30 or final 15 minutes of your exam. Your invigilator will collect your exam paper when you have finished.

#### Help during the exam

Invigilators are not able to answer queries about the content of your exam paper. Instead, please make a note of your query in your answer script to be considered during the marking process.

If you feel unwell, please raise your hand so that an invigilator can assist you.

You may **not** use a calculator for this exam.

## INDUSTRIAL SUSTAINABILITY (22WSD602)

Summer 2023

2 Hours

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Answer **ALL 4** questions.

Questions carry the marks shown.

Calculators are **NOT** permitted.

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1. Most economies around the world are developing and globally there is a rise in the number of the middle classes.
  - a) Explain why both the global population and the average income of this population will increase over the next 50 years and why this will lead to an increase in planetary demand for energy production. [4 marks]
  - b) The Human Development Index (HDI) is a useful metric for determining the quality of life of a nation. Describe how an increase in the HDI is likely to lead to specific increases in environmental impact of a nation. [6 marks]
2. A growing number of multinational manufacturing companies within the apparel sector are considering adopting Circular Economy Business Models (CEBM) for improving their long-term sustainability.
  - a) Describe four new operational capabilities required by such manufacturing companies to be able to adopt CEBM. [8 marks]
  - b) Identify two types of CEBM and explain how these could be used to reduce the environmental impacts associated with apparel manufacture. [12 marks]
3. The concerns over global food security and access to affordable nutrition have significantly increased over the past few years. In this context, identify two major sources of vulnerabilities in food supply chains and explain how these could be addressed to improve the long-term resilience of the food manufacturing sector. [10 marks]

4. Product service systems are one approach that a company may utilise to reduce their environmental impact.
- a) Explain how the definition of an advanced service differs from that of a product service system. [4 marks]
  - b) Consider a company that changes from undertaking its own powder coating of mechanical components, to outsourcing this task to another company. Describe two ways in which the implementation of this advanced service may lead to a reduction of environmental impacts, providing an example for each description. [6 marks]
  - c) With the aid of a diagram describe the additional front office activities that a multifunctional device (printer-photocopier) manufacturing company may have to implement or introduce when offering an advanced service over a pure product offering. In your answer discuss how this might lead to tensions between production activities and service activities within the company and how these tensions could be resolved. [10 marks]

**E. Woolley**  
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