MANUFACTURING ENGINEERING TRIPOS PART I

Friday 30 April 2010 9 to 10.30

PAPER 6

Module 3P10: CONTEMPORARY ISSUES IN MANUFACTURING

*Answer **all** questions.*

*Answers to sections **A**, **B** and **C** must appear in three separate booklets.*

All questions carry the same number of marks.

*The **approximate** percentage of marks allocated to each part of a question is indicated in the right margin.*

There are no attachments.

STATIONERY REQUIREMENTS	SPECIAL REQUIREMENTS
8 page answer booklet x 3	Engineering Data Book
Rough work pad	CUED approved calculator allowed

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

Version: Final

SECTION A

1 (a) CO_2 emissions can be related to global drivers using the *Kaya identity*:

$$F = P\ (G/P)\ (E/G)\ (F/E)$$

Define each of the terms in this expression.
With reference to each term, outline what would be required to achieve a significant reduction in global emissions. [30%]

(b) Outline ways in which global energy usage resulting from the iron and steel sector could be minimised, indicating the feasibility and impact of the measures you propose. [30%]

(c) What is ISO 14001, and why might a company seek certification of its conformance with this standard? [40%]

SECTION B

2 (a) A small company, LigaNew, hires you as an expert on medical implant manufacturing, to help guide them through the process of commercializing a novel tissue-engineered ligament replacement. The implant uses autologous cells embedded in a hydrogel polymer. The Board of Directors of the company consists of venture capitalists with no background in the medical devices field. Provide briefing notes for them on the following topics:

(i) the basic premise of tissue engineering and any advantages or disadvantages associated with the use of autologous cells;

(ii) the current state of the tissue-engineered products market and how existing commercial products compare with the LigaNew product; and

(iii) the process of regulatory approval for this implant and how this process differs between the USA and the UK. [50%]

(b) For future generations of implants, LigaNew is considering replacing the inert hydrogel scaffold with a polymer-based drug delivery system. Describe, with examples, the options for three different types of these systems and explain the parameters that control the drug delivery kinetics for each system. [50%]

SECTION C

3 Drawing on your experience of the MET1 visits programme, and other sources as appropriate, describe typical HR practices in UK Aerospace and Automotive companies. Discuss the extent to which any differences in these practices are attributable to sector or individual company differences. [100%]

END OF PAPER