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MANUFACTURING ENGINEERING TRIPOS PART IIA

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Friday 1 May 2015 9 to 10.30

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**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.*

*Write your candidate number **not** your name on the cover sheet.*

**STATIONERY REQUIREMENTS**

8 page answer booklet × 3

**SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM**

CUED approved calculator allowed

**10 minutes reading time is allowed for this paper.**

**You may not start to read the questions printed on the subsequent pages of this question paper until instructed to do so.**

SECTION A

1. A UK-based clothing retailer has suffered some adverse publicity relating to its environmental performance in an article in the popular press. The specific criticisms related to wasteful factory operations both in the UK and in their factory in Sri Lanka. You have been hired to advise them.

(a) Describe how you would plan and execute a project to reduce the environmental impact of the UK factory, looking at energy, water and waste. What aspects would you prioritise, and why? Divide your proposals into changes that could be put into immediate practice over the next 6 months, and changes for the medium term (up to 5 years). What are the financial implications of your proposals? You may wish to make reference to McKinsey Abatement curves. [60%]

(b) What differences would you expect make in drawing up a similar set of proposals for the factory in Sri Lanka? [15%]

(c) What advice would you offer the company about measures they could take to improve their medium and long-term environmental performance and also reduce their vulnerability to future attacks by the press? [25%]

SECTION B

2 You are the Materials expert in a company manufacturing components for Total Hip Arthroplasty. One component manufactured by your company is the acetabular cup, made from ultra high molecular weight polyethylene (UHMWPE). A new supplier of the raw material needs to be evaluated.

(a) What are the properties of this polymeric biomaterial you would need to examine to ensure this supply is suitable? Divide your answer into:

(i) Physical, chemical or mechanical considerations, and [30%]

(ii) Biological considerations [20%]

Where suitable, include examples of relevant case studies, test techniques and standards.

(b) (i) The medical technology sector is developing rapidly. Describe briefly four trends shaping this development. Identify clearly if your examples are trends in technology, markets, management, regulations, etc. [20%]

(ii) Tissue engineering is one key approach to regenerative medicine. Describe what is meant by "tissue engineering". Include in your description a note on its potential applications as well as the key steps and components required to manufacture a replacement tissue for implantation into the human body. Use examples to illustrate your answer, where suitable. [30%]

SECTION C

3 During the factory visits this academic year to companies in the automotive sector (McLaren and Jaguar Landrover), a variety of practices were observed under the following categories:

- (1) Operations management
- (2) Quality control

- (a) Describe the practices observed in these companies, commenting on similarities and differences in these practices between the companies. [70%]
- (b) Discuss the reasons behind the differences in practices observed. [30%]

**END OF PAPER**