

MET2
MANUFACTURING ENGINEERING TRIPOS PART IIA

Friday 5 May 2017 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.

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

STATIONERY REQUIREMENTS

8 page answer booklet x 3

Rough work pad

SPECIAL REQUIREMENTS TO BE SUPPLIED FOR THIS EXAM

CUED approved calculator allowed

Engineering Data Book

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) Why might a company wish to 'go green'? Briefly discuss the different reasons for companies choosing to address the sustainability agenda, noting whether the benefits are primarily environmental, social or financial. [40%]

(b) In the context of the automotive industry, describe what is meant by each of the following concepts:

- (i) Zero waste to landfill;
- (ii) Product Service Systems.

For each concept, explain how it may be implemented, using specific examples. In each case, describe the environmental consequences you may expect and highlight the financial implications of implementation. [60%]

SECTION B

- 2 (a)
- (i) Explain in detail what is meant by *classification* of medical devices. Include in your explanation reasons for employing a classification system and the differences between classification procedures carried out in the USA and the EU. [20%]
- (ii) Explain what is meant by the term *bioethics*. Include a brief note about any three principles of bioethics that have evolved as a result of international studies, inquiries or reports. [20%]
- (iii) Explain what is meant by the term *cytotoxicity*. Include in your answer why medical device manufacturers are required to measure cytotoxicity and give an example of how it is measured. [10%]
- (b) (i) Polymers and ceramics are two common biomaterials. For each material, describe two benefits and two challenges associated with including them in implanted medical devices. [30%]
- (ii) Describe any two approaches to nanomanufacturing. Explain how nanomanufacturing is supporting the field of personalised medicine. [20%]

SECTION C

3 (a) During MET IIA Industrial Visits you observed a wide range of different Operations Management practices. Using examples from at least 4 different manufacturing companies that you visited, describe the influence of production volume and product variety on operations management practices. [60%]

(b) From your observations during the visits, describe where a specific sector has been proactive in considering sustainability issues in manufacturing. Give examples in your answer detailing the companies visited, the sustainable practices observed and the reasons for these practices being implemented within the sector. [40%]

END OF PAPER