Version RD/4

MET2
MANUFACTURING ENGINEERING TRIPOS PART IIA

Thursday 3 May 2018 9:00 to 10.40

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 at the start of the exam.

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 The Three R's *Reduce, Re-use, Recycle* are promoted as good guidance for reducing waste in industrial as well as domestic situations. An aerospace factory is proposing using this as its slogan for a campaign to reduce waste of materials and resources in relation to its manufacturing operations. Its main reason for running the campaign is to reduce costs, but it also wants to improve its public image as an environmentally aware firm.

(a) Identify the main sources of waste of materials and resources for the operations of an aerospace factory. How would you assess which factors are expected to have the biggest environmental impact? [30%]

(b) Discuss how each of the Three R's can be applied to reducing waste of materials and resources, illustrating your answer with specific examples from the aerospace sector. Discuss the relative financial impact of the different waste reduction measures noted in your discussion. [50%]

(c) The firm wishes to promote itself to the factory shop-floor workers as environmentally aware. What aspects of the campaign should it emphasise? [20%]

SECTION B

2 (a)

(i) Describe what is meant by *biocompatibility*, specifically in relation to materials used in medical devices. Include in your description any two reasons that could prompt manufacturers to run biocompatibility tests. [25%]

(ii) Explain what is meant by the term *tissue engineering*, including in your explanation a definition of what is meant by *tissue*. Explain any two challenges faced by regulatory bodies when developing regulations for tissue engineering products. [25%]

(b) (i) You are in the Research and Development department of a firm manufacturing components for total hip replacement. You are leading the development of a new metal femoral stem, as shown in Fig. 1. Explain the range of considerations that would have to be taken into account before a final decision was taken on the specific metal alloy for this component. [30%]

(ii) Briefly describe any two changes to the medical device legislation introduced in 2017 in the new Medical Devices Regulation Directive (EU/2017/745). [20%]

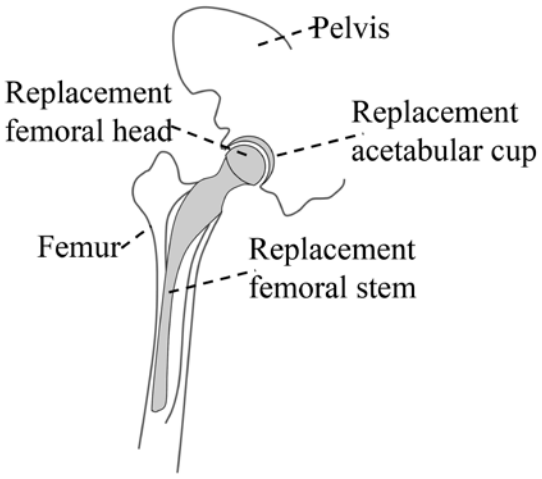

Fig. 1.

SECTION C

3 (a)

(i) A variety of innovation dimensions have to be managed simultaneously to enable scale-up of an emerging technology. Briefly describe any three such dimensions. [30%]

(ii) Explain what is meant by the term *infra-technologies*. Give three examples of different types of infra-technology. Include in your explanation the role they play with regard to emerging technology scale-up, using examples to illustrate. [20%]

(b) Describe in detail what is meant by the term *manufacturing readiness*. Include in your description how it is assessed and why it needs to be managed during technology scale-up. [50%]

END OF PAPER