

MET3  
MANUFACTURING ENGINEERING TRIPOS PART IIB

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Wednesday 25 April 2018      9.00 to 12.10

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**PAPER 2**

*Answer not more than **four** questions.*

*Answer each question in a separate booklet.*

*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 4

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.**

1 (a) For a large manufacturing firm, describe how *technology roadmapping* and *technology intelligence* techniques could be used to help the firm respond to the emergence of a new production technology. [50%]

(b) Discuss, illustrating your answer with examples, how governments can support manufacturing firms of all sizes in responding to the emergence of a new production technology. [50%]

Version CV/3

2 You are the Chief Operations Officer in a large multinational manufacturing firm of construction and mining equipment. The firm's strategy focuses on delivering industry-leading products and services to customers, and achieving profitable growth for the shareholders.

(a) Describe how the *five operations performance objectives* could be structured for your firm's operations. [30%]

(b) Describe an example of a digitally-enabled solution that could expand your firm's offerings and increase customer loyalty. [30%]

(c) Your firm realises that it is losing revenues from the sale of parts and servicing to independent maintenance firms often using replacement parts from third-party suppliers. Discuss how you can use the phases of *service design thinking* to introduce a service to solve this problem. [40%]

3 You are the Chief Technology Officer (CTO) of a technology-based venture with 25 employees. Your venture has developed and patented an innovative technology which has a wide range of applications across different industries. The venture has received substantial venture capital investment. Your strategy is to grow the business through licensing the technology to a number of firms in different industries.

Your venture has recently been approached by a very large technology-based firm. This large firm has adopted an open innovation approach. It has identified your venture's intellectual property (IP) as essential for developing a technology that it needs for upgrading its major product. The large firm would struggle to stay competitive without that upgrade. Your venture is the only potential partner the large firm has been able to identify.

(a) Discuss the threats and opportunities for your venture when engaging in collaboration with the large firm. [50%]

(b) Discuss what you, as the venture's CTO, should consider when discussing IP ownership and usage rights during contract negotiations with the large firm. [50%]

4 Dresswell, a small-sized manufacturer of outdoors and sports clothes, has been looking for ways to reduce the environmental impacts arising from its operations, and minimise its carbon footprint by using sustainable fibres for its clothes. The firm is reviewing all the manufacturing processes, fabrics, logistics, supplier relationships, the use of clothes by their customers, and eventually clothes disposal. The firm is also considering avenues for growing and transitioning the business towards a more circular business model. Dresswell is keen to explore technology and business model innovations to implement return and collection systems (either in partnership, or fully owned and controlled by the firm) that take into account repair, reuse, exchange, rental and remanufacture of clothes.

In this context:

- (a) Explain the concept of *value uncaptured*, illustrating your answer using specific examples. [30%]
  
- (b) What is the *Value Explorer* tool? Explain how you could use this tool to identify value uncaptured for Dresswell. Drawing on case studies from different industries and your own knowledge, describe new value opportunities for Dresswell. [50%]
  
- (c) Propose a sustainable business model for the firm which emphasises creating, delivering and capturing sustainable value. [20%]

Version CV/3

5 (a) Explain what is meant by *operations strategy*. [40%]

(b) Describe how an *operations strategy* could be developed. [40%]

(c) Discuss the linkages between the development of *business strategy* and *brand identity*. [20%]

6 (a) Explain the differences between:

(i) brand;

(ii) trademark; and

(iii) product.

[15%]

(b) Illustrating your answers with examples, sketch and describe what is meant by:

(i) a technology 'S-curve';

(ii) a consumer adoption curve; and

(iii) a product life-cycle.

[35%]

(c) Discuss how the concepts from part (a) and (b) can be used by a product manager to support the launch and subsequent management of an innovative product to maximise value capture for the firm.

[50%]

**END OF PAPER**

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