

National Exams December 2010

07-Mec-B5, Product Design & Development

THREE (3) hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is an OPEN BOOK EXAM.
Any non-communicating calculator is permitted.
3. FIVE (5) out of the SEVEN (7) questions constitute a complete exam paper.

The first FIVE (5) questions as they appear in the answer book will be marked.
4. Each question is of equal value.
5. Most questions require an answer in essay format. Clarity and organization of the answer are important.

Question (1) (20 Marks)

- A. Describe the role that a design engineer plays in a new product development process.
- B. Outline the steps that are required in a new product development project leading up to the detailed engineering work.
- C. Outline the activity associated with commercializing a design after the detailed engineering design work is completed.
- D. In addition to having a design engineer on a new product development team what other roles need to be filled?

Question (2) (20 Marks)

- A. The design process often relies on a complex range of background information. Identify and discuss FIVE (5) sources of design information. Be sure to include the issues associated with collecting the information and the underlying reliability of the information.
- B. Nature has often been a source for considerable design inspiration. Identify and discuss THREE (3) examples of how nature has inspired a technical product either in its function or form.

Question (3) (20 Marks)

- A. Compare and contrast an engineering design process on a highly technical product like an internal combustion engine to an artist's design process on a purely artistic item like a sculpture.
- B. Describe the challenges associated with capturing the essence of the design details in each case.
- C. In what different ways might success be gauged for each case?

Question (4) (20 Marks)

- A. Outline and discuss FIVE (5) substantial ways in which the design process has changed from ancient times to present day.
- B. How does geographical location impact design? Provide an example of a product that serves a similar function yet is substantially different depending on the geographic location where it is used.

Question (5) (20 Marks)

- A. Compare the design process that a steam engine went through during its period of rapid development to the design process currently used to develop a modern mobile phone.
- B. Identify THREE (3) modern design tools that are now commonly used and outline how they have been applied to improve the quality of a design and how they have impacted the design process.

Question (6) (20 Marks)

- A. Propose SIX (6) questions you would ask in a design review meeting and outline the information that each question is intending to identify.
- B. How would this review meeting differ if it occurred early or late in the product development process?

Question (7) (20 Marks)

- A. Identify and discuss FIVE (5) phases that a new product goes through as part of the product development process.
- B. How do the methods of protecting the intellectual property associated with the design ideas change through the design process.
- C. Discuss the tools that are available for designers to communicate detailed design information.
- D. What are the communication challenges that result from the use of a distributed design team that is split between multiple facilities? Include the scenario of having team members working from different countries.

Marking Scheme

1. (a) 4 marks
(b) 6 marks
(c) 6 marks
(d) 4 Marks
2. (a) 15 marks
(b) 5 marks
3. (a) 10 marks
(b) 6 marks
(c) 4 marks
4. (a) 15 marks
(b) 5 marks
5. (a) 11 marks
(b) 9 marks
6. (a) 12 marks
(b) 8 marks
7. (a) 10 marks
(b) 2 marks
(c) 4 marks
(d) 4 marks