National Exams May 2013

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. No calculator is permitted.

3. Question ONE (1) must be completed and is worth 40%, choose Four (4) out of the SIX (6) remaining questions each worth 15% for a total of 100%.

4. The first FIVE (5) questions as they appear in the answer book will be marked.

5. Most questions require an answer in essay format or the use of tables, figures and charts. Clarity and organization of the answer are important.

QUESTION 1 MUST BE COMPLETED.

Question (1) (40 Marks)

Select ONE (1) of the following THREE (3) products and use it to demonstrate your understanding of the design process based on items A – F below.

i. Kitchen kettle
ii. Bicycle trailer
iii. Car jack

*Suggestion: This is meant to be an open ended question where the process is more important than the actual design so develop a design direction and consistently follow it through to completion showing each step in the design process. I would recommend focusing your specifications of interest at a high level and discuss things like overall shape and size of main features and the full product, consider how the main components interact and how the product interacts with the end user as well as major material and manufacturing issues.

A. Pick one product from the list and outline three (3) different ways of establishing design specifications for these products.

B. Pick one of the methods you identified in part A and summarize the nature of the information that would be potentially collected for the product you choose.

C. Using the general data summary from part B generate a set of realistic specifications for your product.

D. Using simple sketches show THREE (3) different general design concepts which address the design requirements you outlined in B.

E. Outline a methodology that could be applied to compare the design alternatives.

F. Apply your methodology to rank your design ideas and select one design as the best one.

CHOOSE FOUR (4) OUT OF THE SIX (6) REMAINING QUESTIONS.

Question (2) (15 Marks)

Canada's population, geography and industry are very diverse. Many people believe that this diversity is one of Canada's strength's as a nation.

A. Outline how diversity can be used to enhance the design process.
B. Discuss some of the challenges diversity can bring and provide suggestions for overcoming these challenges.

Question (3) (15 Marks)

A. Describe the differences in the design process you would use to develop an entirely new product versus refine an existing one.
B. Outline the different team requirements and skill sets for these two (2) design processes.

Question (4) (15 Marks)

A. Discuss three (3) different ways to communicate important design information within a design team.
B. Describe the process a team can use to optimize a design. Provide clear examples of what information is needed to optimize the performance of a common item you interact with every day.

Question (5) (15 Marks)

A. Identify and describe five (5) different options for securing intellectual property (IP) associated with a design.
B. Pick an example of a recently launched product and outline the advantages and disadvantages of each option listed in 5 A.

Question (6) (15 Marks)

When designing a new product, designers can use a number of design techniques like Design for Manufacturing, Design for the Environment, Universal Design.

A. List two (2) different constraints for each of the three techniques outlined above.
B. Using examples provide an outline of how the technique impacts the design.
C. Outline the impact that these different techniques have on society as well as short term and long term financial costs.

Question (7) (15 Marks)

Consider a door handle as shown on the right.

A. Outline three (3) different ways of manufacturing a part with this basic function.
B. What factors in design are important in choosing a final manufacturing process?
C. Develop the framework of a selection method for choosing the best manufacturing technique for your target market based on your design.