University of Toronto
Faculty of Applied Science and Engineering
APS111H1S - Engineering Strategies and Practice I
Course Instructor: Mr. Jason Grenier
Communication Instructor: Dr. Maria Cioni
Final Examination

April 20th, 2011
2:00 – 4:30pm

Full Name: _____

Student Number: _____

Final Examination Instructions

1. This is a Type A: Closed book examination, no aids permitted.
2. Ensure that you have all 14 pages of this final exam.
3. You have 2 hour and 30 minutes to complete this exam.
4. Read each question carefully and answer in the space provided.
5. Marks for each question are indicated in square brackets [ ].
6. Questions 3 – 20 must be answered in full sentence/paragraph structure using good engineering writing.
7. Attempt all questions in the space provided.
8. Question 20 is the only question that is to be completed in the exam booklet.

TOTAL MARK
_____
135

Question 1: [15 Marks]
For the multiple-choice portion, circle the most correct answer to each question on the answer card. Only one answer is to be given for each question.

1.1) An oral presentation will be strong if the presenter does the following:
(a) Holds the audience interest with knowledge
(b) Leaves a take away message
(c) Ensures that slides support the presentation
(d) Repeats questions from the audience before responding
(e) All of the above

1.2) Which one is NOT a constraint?
(a) The design shall meet the Ontario Environmental Safety Code
(b) The design must be safe for children to use
(c) The budget should be under $1,000
(d) The design shall not pollute swimming pool water
(e) None of the above

1.3) The following are processes relevant to engineering:
(a) Engineering design
(b) Revising a specific document
(c) Creating iterations of the same document
(d) All of the above
(e) None of the above

1.4) The organizing steps for an Oral Presentation are:
(a) Determine a purpose
(b) Develop a main idea
(c) Provide credible statements to support the main idea
(d) Conclusion and take away message
(e) All of the above

1.5) The PEO Code of Ethics states that the following is of paramount (most) importance:
(a) duty to the employer
(b) duty to the client
(c) duty to public welfare
(d) income of engineers
(e) meeting legal requirements
(f) None of the above

1.6) The Citicorp Centre building was in danger of collapse due to:
(a) flooding
(b) wind loads
(c) snow loads
(d) parking on the roof
(e) terrorist attack
(f) None of the above

1.7) Project requirements can best be described as:
(a) an accurate, general statement describing all aspects of the problem
(b) an accurate, general statement describing the design alternatives
(c) a clear, specific description of all aspects of the problem
(d) a clear, specific description of the design alternatives
(e) a bulleted list of requirements that the solution must fulfill
(f) a clear explanation of the service environment in which the solution must operate
(g) None of the above

1.8) Which of the following is correct?
(a) Money obtained now is worth more than the same amount obtained later
(b) Money obtained later is worth more than the same amount obtained now
(c) Paying an amount of money later is less costly than paying the same amount now
(d) Paying an amount of money now is less costly than paying the same amount later
(e) Money obtained or paid now is the same as obtaining or paying the same amount later
(f) a and c
(g) b and d

1.9) Which of the following is an example of an engineering artifact that was inappropriately designed for human factors?
(a) PalmPilot PDA (Personal Digital Assistant)
(b) Fender Stratocaster guitar
(c) Mercedes-Benz E320 electronic oil-checking feature
(d) All of the above
(e) a and b
(f) a and c
(g) b and c

1.10) The two top rungs on the Human-tech ladder are:
(a) team and organizational
(b) team and political
(c) organizational and political
(d) psychological and team
(e) psychological and organizational
(f) psychological and political
(g) None of the above

1.11) Which of the following has had significant social impacts?
(a) Hydroelectric dams
(b) Slot machines
(c) Trains
(d) a and b
(e) a and c
(f) b and c
(g) All of the above

1.12) Which of the following is a "best practice" for community consultation?
(a) Only involve those who may cause problems with approval of the design
(b) Include the cost and time for community consultation in your project plan
(c) Consult primarily at the end of the design process
(d) a and b
(e) a and c
(f) b and c
(g) All of the above

1.13) Which of the following is consistent with the Human-tech approach to design?
(a) Increased functionality is a priority
(b) Design should adapt human nature to accommodate technology
(c) Design with feedback
(d) a and b
(e) b and c
(f) All of the above

1.14) To help achieve sustainable development, designers should choose:
(a) the least expensive design
(b) the most advanced engineering design
(c) a design that is acceptable to all stakeholders
(d) the design that has the least environmental impacts
(e) None of the above adequately describes the answer

1.15) The steps of a life-cycle assessment are done in the following order:
(a) Impact analysis , Inventory analysis, Improvement analysis
(b) Inventory analysis, Improvement analysis, Impact analysis
(c) Improvement analysis, Inventory analysis, Impact analysis
(d) Improvement analysis, Impact analysis, Inventory analysis
(e) Impact analysis, Improvement analysis, Inventory analysis
(f) Inventory analysis, Impact analysis, Improvement analysis

Question 2: [10 Marks]
Clearly circle TRUE or FALSE in response to each statement.

[TRUE or FALSE]: Weighted decision matrices are used to compare functions to objectives
[TRUE or FALSE]: Morphological charts are used to uncover hidden functions of the design
[TRUE or FALSE]: Overhead costs are an example of ongoing costs
[TRUE or FALSE]: Engineering design is different than problem solving
[TRUE or FALSE]: It is important to discover the unintended functions
[TRUE or FALSE]: Final costs are also known as decommissioning costs
[TRUE or FALSE]: Engineering is a self-regulated profession
[TRUE or FALSE]: The Iron Ring represents a Professional Engineering license
[TRUE or FALSE]: The Canadian Engineering Accreditation Board is responsible for providing standard engineering licensing criteria.
[TRUE or FALSE]: A licensed Professional Engineer in Ontario can practice engineering in any Canadian province.

Reminder: Questions 3 – 20 must be answered in **full sentence/paragraph** structure using good engineering writing.

Question 3: [2 marks] What is meant by Economies of Scale? Give an example.

Question 4: [3 marks] What is meant by the 'time value of money'? Given an example.

Question 5: [3 marks]
Tammy had $100 for the purchase of a new scuba diving mask two years ago. Suppose that she did not buy the scuba mask and invested her money at an annual compounded interest rate of 25%, how much is her $100 worth today? (You can leave your answer in fraction form to avoid needing a calculator).

$$PV = FV\left(\frac{1}{1+r}\right)^t$$

Question 6: [2 marks] Which Act governs the engineering profession in Ontario?

Question 7: [2 marks] Who is the governing body for engineers working in Ontario?

Question 8: [2 marks] What are two responsibilities of this governing body?

Question 9: [4 marks]
What are four licensing requirements to become a licensed Professional Engineer in the Province of Ontario?

Question 10: [2 marks] Who produces the Engineering Dimensions Magazine?

Question 11: [2 marks] What is contained in the 'blue pages' of the Engineering Dimensions magazine?

Question 12: [4 marks]
Give four examples of professional misconduct under the law that governs the engineering profession in Ontario

Question 13: [5 marks total]
Recently, Ontario brought in a law which bans the use of handheld devices while driving, e.g., no talking on cell phone hand sets or operating of MP3 and GPS devices while driving. This law was enacted in an effort to improve road safety.

(a) [2 marks]: At the physical level of Vicente's Human-tech ladder, explain how this law may improve road safety?

(b) [2 marks]: However, drivers are still allowed to use hands-free devices while driving, e.g., talk on the phone using a Bluetooth headset. At the psychological level of the Human-tech ladder, explain how this law may not improve road safety?

(c) [1 marks]: This law originates from which level of the Human-tech ladder?

Question 14: [8 marks Total]

(a) [2 Marks]: In the ethics case study discussed in Dym & Little what did William J. LeMessurier help design and in what city?

(b) [3 Marks]: Describe LeMessurier's ethical dilemma?

(c) [3 Marks]: What were LeMessurier's ultimate decision and actions? What might have been the consequences if LeMessurier had made a different decision?

Question 15: [4 marks]
Explain any two of the following terms:
"Cradle to grave" "Social equity" "Solution driven" "Topic sentence" "Genre"

Question 16: [2 marks] Explain the difference between an executive summary and a conclusion.

Question 17: [3 marks]
There are two parts to this question. Part 1, create a concise paragraph by rearranging the order of the sentence numbers (E.g. 1,4,3...).

1. It is possible to make sentences more clear if the verb is put after the subject near the beginning of the sentence.
2. Therefore, writing a paragraph that "flows" means that both ideas and sentences are organized.
3. Engineering writing is clear and concise.
4. Presenting ideas and information from known to unknown engages the reader.
5. The topic sentence presents the most important idea in a paragraph and it is the first sentence.

New order: _____

Part 2, identify and re-write the one unclear sentence from above:

_____

_____

Question 18: [10 marks Total]
Pick one of the two following legal cases discussed in lectures and answer the questions below

1. Donoghue v. Stevenson, [1932] A.C. 562

or 2. Hedley Byrne & Co. Ltd. v. Heller & Partners Ltd., [1989] 1. S.C.R. 426

(a) [5 marks] Summarize the legal case, clearly identifying the situation and the legal findings

(b) [5 marks]: What were the results of this legal case and how does it affect Engineers?

Question 19: [2 marks]
In order to satisfy the courts that a plaintiff has suffered a tort, what are two things that the plaintiff must prove:

Question 20: [50 Marks Total]

Read the client statement below and answer the related questions in the exam booklet using headings, subheadings, paragraphs, bullet lists, and labeled figures and tables where appropriate.

Client Statement:

Primo Pizza is located on the main floor of an historic building in downtown Toronto. There are 6 apartments on the two floors above the pizzeria. This is the only restaurant in the city that has a hand-made, 5,000-pound pizza oven made in Naples, Italy. This wood-fired oven produces an extremely high heat, 900 degrees Centigrade, to cook the dough in 90 seconds with the desired charred, blistered crust. While the oven heat is tolerable in the winter, in summer, clients and staff feel that they are inside a steam bath. The unbearable heat reduces appetites and has started to drive clients away. The owner wants to cool the seating area so that customers can eat their pizza in comfort.

Since the special oven is a main attraction, the kitchen is open and situated in the middle of the seating area that holds 40 people. Another 10 people can sit at the long bar which runs parallel to the large glass windows at the front of the restaurant. When the restaurant opens at 5 p.m., young and old families come and later at night, singles, couples, larger groups and after-movie crowds eat until closing at 1 a.m.

The restaurant owner is environmentally aware and is conscious of his impact on the environment. The restaurant uses green electricity, a mixture of emission-free wind power and low-impact water power. Since the pizza oven has cost so much money, the owner's budget to cool the restaurant is $1,000 maximum and would be interested in lower cost designs. Finally, the restaurant would prefer that the solution be implemented prior to June 1st when the business picks up but can wait as long as July 1st of this year before the really hot weather starts.

In the exam booklet address the following questions:

18.1) Complete the Project Requirements section of the Conception Design Specifications
-Write a concise Problem Statement in your own words [5 marks]
-Identify 5 stakeholders and their concerns with the project [5 marks]
-Formulate functions for the design (all relevant aspects) [3 marks]
-Formulate objectives [3 marks]
-Rank your objectives using a Pairwise Comparison Chart [3 marks]
-Formulate constraints [3 marks]
-Discuss the service environment (all relevant aspects) [5 marks]

18.2) Generate and describe two **feasible** design alternatives (include a sketch for each) [8 marks]

18.3) Use a Weighted Decision-making Matrix to recommend of the your two design alternatives [4 marks]

18.4) Design a metric for your top-ranked objective [3 marks]

18.5) Discuss the Economic Impact of your recommended design [4 marks]

18.6) Discuss the Environmental Impact of your recommended design (a life-cycle diagram is not required) [4 marks]

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