

December 1997

Instructors: Professors G. Wacker and J. Gillies

Time: 3 hours

Note: All questions are of equal value

1. You have a choice: Do EITHER Part A below, OR Part B (True or False).

- A. You have been invited by a local service club to give a luncheon speech explaining how the engineering profession is governed and regulated in Saskatchewan. You agree and in your preparations you ask the club president how long you have for your presentation. She responds by saying that you have twenty-five minutes and that an overhead projector will be available. Prepare a detailed outline of your presentation.
- B. Indicate whether you believe each of the following statements is "true" or "false". You may clarify your answer if you feel the statement is ambiguous, or if it is "true" in part and "false" in part. Do not guess - number wrong subtracted from number correct.
- (a) A primary objective of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) is to ensure to the public that engineering and geoscience work in Saskatchewan is conducted by persons competent to do the work.
  - (b) A secondary objective of APEGS is to serve as a trade union on behalf of its members.
  - (c) The ultimate authority in governing the engineering profession in Canada is vested with the Canadian Council of Professional Engineers (CCPE) which assigns some of those responsibilities to provincial associations such as APEGS.
  - (d) A graduate engineer who has worked under the direct supervision of a senior engineer for four years or more may call himself/herself a P.Eng. in Saskatchewan even though he/she is not registered with APEGS.
  - (e) A registered P.Eng. may sign and seal plans or reports prepared by another engineer or technologist working under his/her direct supervision of the registered engineer.
  - (f) The issue of engineers maintaining their competence in their area of expertise is becoming a very important issue for the profession because APEGS, as well as the engineer, need to be able to demonstrate that competence.

- (g) The definition of the practice of professional engineering in Saskatchewan and in Canada is written so as to include only consulting engineering services offered to the public and is not applicable to engineers working in industry or for government.
  - (h) An employee engineer working for a government department or an industrial corporation has responsibility only to his employer and himself; the responsibility to the public in this case falls entirely to the government or corporation.
  - (i) Principles and responsibilities contained in the Code of Ethics for engineers in Saskatchewan are moral or ethical obligations only, an engineer can choose to adjust them to meet his/her own moral standards and there is no legal responsibility arising from them.
  - (j) An engineer employed by a manufacturing company should not be concerned about adequate financial return to the company - it is not his/her responsibility.
  - (k) An engineer employed by a government department (i.e. city engineering department) should not be concerned about the cost of materials or services - it is not his responsibility.
  - (l) "Since APEGS has the ability to discipline only its members, if I don't join the Association I can practice engineering and the Association cannot interfere."
  - (m) In political or public situations, or legal matters not related to an engineer's work, the engineer can divest himself/herself from professional responsibilities by declaring to all parties involved that he has "divested himself/herself of all professional responsibility and duty of care".
  - (n) APEGS discipline process against engineers has no legal binding authority before the courts.
  - (o) Even if the fault or failure of engineering work can be traced back to an error in the software that the engineer used in doing his/her work, the courts will nevertheless assign all responsibility and liability to the engineer.
2. There has been considerable discussion lately on the impact of global warming, including a major international conference the last few weeks in Kyoto, Japan. It is generally accepted that the use of fossil fuels must be reduced if the rate of global warming is to be reduced.
- (a) What should be the role of practicing engineers and of the engineering profession in addressing the issue of global warming?
  - (b) If you think of all engineering and technical activity as a "social experiment" as described by Martin and Schinzinger, how does your answer change, if at all?

3. A common thread running throughout this course has been that engineering activities occur within a societal context. We have examined how the various economic, business, political, private, public and special interest groups interact with each other and with the engineering work.

If the engineering activity is a major one and results in some real or perceived risks or negative consequences to the public, what roles should engineers play in the decision making process. Discuss this question with reference to ONE of the following:

- selecting a route for a major power line, highway OR irrigation canal in Saskatchewan
- siting a nuclear power station in Saskatchewan
- building a major hydro-electric power station in Saskatchewan

4. An engineer serving as a consultant to the University was conducting a routine inspection of the Phys Ed Gym (Gym 1) last Friday, and he found:

"...actual failures in the (roof) trusses. They were serious failures in that the wood (of some members) was actually ... crushed. It's a 'compression failure' that happens very suddenly. One moment, the truss appears fine, and the next moment, it's falling apart".

"The engineer ordered immediate evacuation of that portion of the building. 'Get them out now. Not two hours from now, but now'."

"U of S maintenance staff willing to go into the condemned building were called in on overtime to remove everything from the building. People who will be working in there will know what the situation is. If they feel it's not safe for them they will not be forced to work there."

Excerpts from the Saskatoon Star Phoenix, Monday, Dec. 6, 1997

"Inadequate government funding is the driving force behind the precarious state of the Phys Ed Gym at the U of S, condemned Friday as unsafe to use, says Tony Whitworth, U of S Vice-President of Finance and Administration. The University knew as long as 10 years ago that the building needed replacement, but there simply wasn't money to tackle the job. You keep putting off more and more maintenance work, and finally get to a crisis."

Excerpts from the Saskatoon Star Phoenix, Monday, Dec. 8, 1997

- (a) What are some possible reasons why the university would have an outside engineering consultant do the inspection when it has qualified civil engineers on its Physical Plant staff?
- (b) On what basis would the engineer exercise such immediate authority, and why would the university comply without any hesitation?
- (c) Comment on the "voluntary" aspect described in the third paragraph of the Dec. 6, 1997 excerpt from the Star Phoenix. Give other examples and criteria when practicing engineers or their clients need to operate on an informed, but voluntary, basis.

5. Assume you are a member of the Ethics Committee for the local Professional Engineering Association. Due to several "whistle-blowing" incidents recently reported in the media, the Committee has decided to prepare a press release to inform the public of the importance and of the circumstances of disclosing improper conduct or dangerous products and practices, etc. From the perspective of the engineering profession, prepare this press release.

6. You are a research engineer for Top Flight which manufactures medium-sized passenger aircraft. You and your team have just completed tests on a new aircraft tail assembly configuration in the wind tunnel. You have found that under certain circumstances, devastating vibrations can occur which might lead to the in-flight destruction of the assembly, with probable loss of the aircraft. Later, at a professional meeting, you hear an engineer from Fly-Fast, your company's competitor, describe a tail assembly for its new aircraft which runs the risk of producing the same destructive vibrations you discovered in your tests. You have an obligation, as a matter of confidentiality, not to disclose your company's proprietary information. On the other hand, you have a duty to safeguard public safety and welfare. What would you do? Explain in detail.

Would your answer be any different if the vibration was not dangerous to passenger safety, but was noisy or increased fuel consumption significantly?

#### GILLIES' SECTION ONLY - STUDENT EVALUATIONS

Note: 1. This portion contains evaluations on additional pages. Please ask for the additional pages.

2. If you are done before 5:00 p.m., you may complete both A and B below and leave. If you need the full three hours to complete the examination above, you will be given extra time after 5:00 p.m. to complete the evaluations below.

- A. The class was divided into "discussion groups". For most classes a reading was assigned and each student in the class was expected to have studied this material prior to class in preparation for participation in discussion within the discussion group.

You were advised that 20% of the final mark for this class will be awarded for participation in the discussion group.

Using the sheets provided, complete the assessment of the participation of all members (excluding yourself) in your discussion group. Your assessment should be based on the following factors:

- contribution,
- participation,
- questions asked, and
- attendance.

- B. Course Evaluations for the College