



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
JANUARY 2011 SESSION**

SUBJECT CODE : FVB 40703
SUBJECT TITLE : ENGINEERING ETHICS
LEVEL : BACHELOR
TIME / DURATION : 9.00am – 12.00pm
(3 HOURS)
DATE : 07 MAY 2011

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For section B answer THREE (3) questions only.
5. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS AND 4 PAGES OF APPENDIX, EXCLUDING THIS PAGE.

SECTION A (Total marks: 40 marks)**INSTRUCTION: Answer ALL Questions.****Question 1 (20 marks)**

(a) There are **FIVE (5)** characteristics of professional. List **ALL** of them.

(5 marks)

(b) Describe the following terms by giving an appropriate example for each term:

I. Common Morality

(2 marks)

II. Personal Morality

(2 marks)

III. Good Works

(2 marks)

(c) Explain the following characteristics of professional:

I. Control of Services

(2 marks)

II. Vital knowledge and Skills

(2 marks)

(d) What is the Professional Ethics? Explain your definition by giving an appropriate example.

(5 marks)

Question 2 (20 marks)

(a) In law, a successful charge of negligence must meet **FOUR (4)** conditions. List **ALL** of these conditions.

(4 marks)

(b) Intellectual Property is property that results from mental labor. List the multiple ways that intellectual property can be protected :

(6 marks)

(c) Describe the "Golden Approach" by giving an appropriate example.

(4 marks)

(d) Explain **THREE (3)** types of Organizational Culture.

(6 marks)

SECTION B: Case Study (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only in this section.

Question 3 (20 marks)

Write a brief summary of the issue (Aberdeen Three-refer to the **Appendix 1**) while incorporating all of the questions given:

- a) What could the three engineers have done differently?
- b) What do you expect was the fate of the inspection reports that had been submitted over the years? What does this say about the institutional culture at the Aberdeen Proving Ground regarding safety?
- c) Should the Justice department have done anything differently?
- d) Do you think the judge's sentencing of the "Aberdeen Three" was too lenient or too harsh? Why?
- e) What are the ethical responsibilities of the employer (the Aberdeen Proving Ground, in this case) to the employees in the Pilot Plant?
- f) What do you (the students) see as your future engineering professional responsibilities in relation to preserving or protecting the environment?

Question 4 (20 marks)

Write a brief summary of the issue (An Only Opportunity – refer to **Appendix 2**) while incorporating all of the questions given below and in the text.

- a) To what extent should one be concerned about whether there is a good match between one's basic ethical commitments and job selection?
- b) What kinds of engineering related jobs, if any, would you decline because of ethical concerns?

Question 5 (20 marks)

Write a brief summary of the issue (Smoking) while incorporating all of the questions:

- a) Imagine that it is several years ago and you have just received your engineering degree. You are in search of your first job. You are invited to interview with a research division of Philip Morris that is about to begin research to develop the Accord. Would you have any reservations about accepting such a position? Discuss.
- b) If you would have some reservations, would the fact that this job pays \$10,000 more a year than any other offer you have convince you to take the Philip Morris offer?
- c) Assuming you took the job, what kinds of ethical concerns might you have about how the device should be designed? (E.g., would you agree that it should have a locking device?)

Smoking

The Philip Morris Companies has been testing a microelectronic cigarette holder that eliminates all smoke except that exhaled by the smoker. Battery powered, it is expected to cost about \$50. The result of years of research, it cost approximately \$200 to develop.

Tentatively called the Accord, the device uses cigarettes that are 62 millimeters long (compared with the standard 85 millimeters). Users will have to remember to recharge the Accord's battery (a 30 minute process, but extra batteries can be purchased). A cigarette is inserted into the 4-inch long, 1 ½-inch wide device. A microchip senses when the cigarette is puffed and transmits powers to eight heating blades. A display shows the remaining battery charge and indicates how many puffs are left in the eight-puff cigarette. The device also contains a catalytic converter that burns off residues.

Supporters of this product say it will be welcomed by smokers who currently refrain from smoking in their homes or cars for the sake of non-smoking family members, guests, and passengers. Although smokers will inhale the same amount of tar and nicotine as from conventional "ultralight" cigarettes, 90 percent of second-hand smoke will be eliminated. Furthermore, the same smoking restriction rules in public places will apply to the device.

Critics claim that the Accord will simply reinforce addiction to cigarettes. Richard A. Daynard, chair of the Tobacco Products Liability Project at Boston's Northeastern University School of Law, an anti-tobacco organization, asks: "Who would use an expensive and cumbersome thing like this if they weren't hooked? There is something grim and desperate about it. This is hardly the Marlboro Man, getting on his horse and checking the battery." He also expresses concern that children might be encouraged to smoke, since the Accord would enable them to hide smoking from their parents. However, Philip Morris replies that the device has a locking device for parents.

Question 6 (20 marks)

Discuss the ethical issues this case raises.

Microwave

After graduating from university after 4 years of grueling undergraduate engineering classes, you go to work for XYZ Industries. XYZ Industries manufactures microwave ovens and other kitchen gadgets. You are hired into a low-level engineering position and as your first task you are asked to test a series of microwave ovens to test their defrosting capability. You proceed to your lab where you find a few dozen microwave ovens in their boxes waiting for you to start your test. You notice that every brand of microwave oven is here, including all of XYZ's competitors' brands.

You unpack all of the microwave ovens and begin your tests. It is kind of boring testing microwave ovens (you have to wait up to five minutes to defrost some of the test items), so you begin to dig through the cabinets in your lab to see what is there. You quickly find out that this is used to be the lab where they tested the microwave oven doors for radiation permeability (the amount of radiation that could escape through the glass door of the microwave ovens). You find a neat little piece of hand-held equipment which apparently was used to measure radiation levels. Being an engineer, you can't resist trying it out. You switch on the meter and point it around the room and out the window, etc. You notice that when you point it at some of the microwave ovens it goes off the scale. You quickly turn off all of the other microwaves, and discover that the reading is not some fluke. The microwave ovens you are standing in front of are emitting higher-than-average levels of radiation. You look and discover that one of the ovens is from XYZ and the other is from ABC, XYZ's arch-rival. These microwave ovens are currently the best-selling ovens on the market, because they are the cheapest ones available. It appears that these bargain ovens may not be as safe as they seem.

Seeing something fishy, you decide to look around a little more. You find the test report that discusses the radiation emissions from all of XYZ's models of microwave ovens. You learn that only the top of the line and the mid-level microwaves were tested. The bargain oven's results had been extrapolated from the test results from the other ovens. What should you do?

END OF QUESTION

Appendix 1

Aberdeen Three

In 1976, Congress passed the Resource Conservation and Recovery Act (RCRA). The purpose of the act was to provide technical and financial assistance for the development of management plans and facilities for the recovery of energy and other resources from discarded materials and for the safe disposal of discarded materials, and to regulate the management of hazardous waste.¹

This 1976 act expanded the Solid Waste Disposal Act thereby authorizing state program-and-implementation grants for providing incentives for recovery of resources from solid wastes, resource conservation, and control of hazardous waste disposal. In addition to establishing the EPA Office of Solid Waste, requiring state planning and a ban on open dumping of solid hazardous wastes, RCRA also implemented criminal fines for violations of the open dumping or hazardous waste disposal guidelines.

Aberdeen is a U.S. Army facility where, among other things, chemical weapons are developed. All three engineers involved in the case were experts in the chemical weapons field, and Dee was responsible for developing the binary chemical weapon. The U.S. Army has used the Aberdeen Proving Ground to develop, test, store, and dispose of chemical weapons since World War II. Periodic inspections between 1983 and 1986 revealed serious problems at the facility, known as the Pilot Plant, where these engineers worked. These problems included

- flammable and cancer-causing substances left in the open
- chemicals that become lethal if mixed were kept in the same room
- drums of toxic substances were leaking. There were chemicals everywhere - misplaced, unlabeled or poorly contained. When part of the roof collapsed, smashing several chemical drums stored below, no one cleaned up or moved the spilled substance and broken containers for weeks.²

The funds for the cleanup would not have even come out of the engineers' budget. The Army would have paid for the cost of the cleanup. All the managers had to do was make a request for the Army clean-up funds, but they made no effort to resolve the situation.

When an external sulfuric acid tank leaked 200 gallons of acid into a nearby river, state and federal investigators arrived and discovered that the chemical retaining dikes were unfit, and the system designed to contain and treat hazardous chemicals was corroded and leaking chemicals into the ground. The three engineers maintained that they did not believe the plant's storage practices were illegal, and that their job description did not include responsibility for specific environmental rules. They were chemical engineers; they practiced good "engineering sense," and had never had an incident. They were just doing things the way they had always been done at the Pilot Plant.

On June 28, 1988, the three chemical engineers, Carl Gepp, William Dee, and Robert Lentz, now known as the "Aberdeen Three," were criminally indicted for storing, treating, and disposing of hazardous wastes in violation of RCRA at the Aberdeen Proving Ground in Maryland after about two years of investigation. Six months following the indictment, the Federal Government took the case of the "Aberdeen Three" to court. Each defendant was charged with four counts of illegally storing and disposing of waste. In 1989, the three chemical engineers were tried and convicted of illegally storing, treating, and disposing of hazardous waste. William Dee was found guilty on one count, and Lentz and Gepp were found guilty on three counts each of violating the Resource Conservation and Recovery Act. Although they were not the ones who were actually performing the illegal acts, they were the managers and allowed the improper handling of the chemicals. No one above them knew about the extent of the problems at the Pilot Plant. They each faced up to 15 years in prison and up to \$750,000 in fines, but were sentenced only to three years' probation and 1000 hours of community service. The judge based his decision on the high standing of the defendants in the community, and the fact they had already incurred enormous court costs. Since this was a criminal indictment, the U.S. Army could not assist in their legal defense. This case marked the first time that individual federal employees were convicted of a criminal act under the Resource Conservation and Recovery Act.

Appendix 2

An Only Opportunity

Gerald Wahr was not prepared for such a sudden turn of events. He was scheduled to complete his degree in chemical engineering in June. He planned to return to help his parents run the family farm right after graduation. However, in early May his father, Hans Wahr, became seriously ill, and it was evident he would be hospitalized for an extended period of time. Gerald's mother and his older brother could continue to run the farm. But the medical bills would quickly mount. Without an additional source of income, the family would soon begin defaulting on its mortgage payments. The best hope for saving the farm would be for Gerald to find employment as an engineer.

Since Gerald had expected to return to the farm, he already missed many opportunities for job interviews. He would have to work quickly. After an intensive search, only one solid opportunity surfaced. Pro-Growth Pesticides, Inc. would be on campus next week to interview candidates for a supervisory job requiring a degree in chemical engineering.

Gerald certainly seems well qualified for the job. However, there is a hitch. The Wahr farm uses strictly organic methods. Gerald's father had always opposed the use of pesticides on their farm. In fact, he was rather outspoken about this among the farmers in the area. Gerald admired this in his father. As a young child he often proudly announced that he wanted to grow up to be just like his father. Hans Wahr, however, had different ideas about this. A high school dropout, Hans advised young Gerald to further his education. "Without a college degree," he told Gerald, "you'll be as ineffective as I am. You have to fight fire with fire. If you really want to show those pesticide folks a thing or two, you've got to be able to talk their language." So, Gerald decided he would go to college and study chemical engineering.

Gerald's study of chemical engineering did nothing to shake his conviction that organic farming is best. Quite the contrary. He is now more convinced than ever that the pesticide industry is not only harming the environment generally, but farm products in particular.

Should Gerald go for the interview? Discuss.

II. Conversations With Friends

At first Gerald rejects the idea of going for the interview. He thinks of it as a matter of integrity. How could he work for a company that researches, produces, and markets the very products he and his family have so long opposed? However, his friends counsel him otherwise. Here are some of their arguments. How might Gerald respond to them?

Allen: Look, if you don't go for the job, someone else will. The job won't go away just because you stay away. So, the work's going to be done anyway. Your refusing the job won't change a thing.

Bob: Right! Furthermore, you need to look at this from a utilitarian point of view--the greatest good for the greatest number. If you don't go for the job, someone else who really believes in pesticides will--and that's going to make things even worse! If you take the job and aren't gung ho, that might just slow things down a little.

Don: Besides, you might be able to introduce a few reforms from the inside. That won't kill the pesticide industry, but it might make it a little bit better--certainly better than if some zealous pesticide nut takes the job.

Allen: So, it's pretty clear what to do. All things considered, you ought to go for the job. It's your only real chance to save the farm; and if someone else gets the job, Pro-Growth will cause even more harm. You can't be a purist about these things. It's not a perfect world, you know.

III. The Interview

Gerald Wahr is uncomfortable during the interview, but it seems to be going rather well. However, the interviewer then asks: "There are a lot of people who disapprove of the use of pesticides in farming. Of course, Pro-Growth disagrees. What are your thoughts about the use of pesticides?" How should Gerald answer this question?

IV. Jobs

Gerald Wahr's situation may seem extreme. However, it does raise important questions about job choices. To what extent should one be concerned about whether there is a good match between one's basic ethical commitments and job selection? What kinds of engineering related jobs, if any, would you decline because of ethical concerns?