

TR2202

NATIONAL UNIVERSITY OF SINGAPORE

TR2202 – TECHNOLOGICAL INNOVATION

(Semester II : AY 2004-05)

Time Allowed: 2 Hours

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**INSTRUCTIONS TO CANDIDATES**

1. This examination paper contains **TWO(2) Questions**. You must answer **ALL THE QUESTIONS**.
2. Answer each question in a **separate booklet**. Hand each question up separately.
3. The total score for this examination is 100 marks. Please pay attention to the number of marks awarded for each question in deciding how much time to spend on it.
4. You will be rewarded for writing answers that are thoughtful, creative and concise.
5. This is an open book examination. Students are allowed to bring in any books and any amount of notes. Students were told beforehand to bring in copies of all case studies discussed during the semester.

## QUESTION 1: (50 Marks)

Answer all parts of this question.

*Instructions: Please refer to the Harvard case study on Calgene, Inc, which you brought into the examination hall.*

1.1 Imagine that you have just joined Calgene as a Product Development Manager. You have been tasked to recommend an appropriate roadmap for current and future product development projects. To create an aggregate project plan, you begin to find answers to the following questions:

1.1.1 Classify the product development projects that Calgene is currently undertaking, using the Aggregate Project Plan (breakthrough, platform, etc). Please provide reasons for your classification.

[10 marks]

1.1.2 Evaluate the effectiveness of each project you classified above (question 1.1) in achieving the company's business objectives and strategies. Provide a final list of projects, indicating which you would like to keep or remove, as well as any new projects you would like to propose.

[15 marks]

1.1.3 Discuss, with supporting arguments and examples, how your aggregate project plan may have an impact on the motivation of your scientists.

[5 marks]

1.2 *".. In addition to forward integration, Calgene also formed several commercial partnerships with major corporations that led specific markets. Such arrangements took the form of joint ventures, contract research, or licensing agreements. Calgene's corporate partners included Campbell Soup in tomatoes, Rhone-Poulenc Agrochimie in herbicide-resistant cotton, Unilever and Procter & Gamble in edible oils and detergents, and Nippon Steel and Mobil oil in industrial oils and lubricants."*  
(Source: p4, Harvard case study on Calgene, Inc)

1.2.1 Discuss how effective these partnerships have been in contributing to Calgene's product development strategies and market entry strategies?

[10 marks]

1.3 One day, you were informed by a phone call that your competitor, DNAP, had invited your partner, Campbell Soup, to invest in their research on VineSweet tomatoes. The VineSweet tomato competes head to head with your Flavr Savr tomato.

1.3.1 What would you do to protect the interests of Calgene?

[10 marks]

--- END OF QUESTION 1 ---

## Question 2: Emily's Headphones

Read the case and answer the questions below.

Emily is your friend who is studying for her Ph.D. at the Biomaterials Department, NUS. She has been trying to develop new materials that can "peer under the skin" without injuring it. This is possible because the skin is made up of semi-porous layers that can breathe. Emily has dreamt of endless possibilities for this technology, including doing blood tests without having to stick a needle into the patient. Last September, she presented this idea at the International Biochemistry and Biomaterials Conference in Hawaii. Many people were interested, but at that time, it was just an idea as she hadn't come up with an actual material that could achieve this goal.

Shortly thereafter, she made a big breakthrough in her research and came up with a new spongy material that can sense the condition of a person's blood under the skin. She named this material Benjisponge, after her dog's name (Benji doesn't like needles). The advantage of this approach is you no longer have to stick a needle into a person just to do a blood test. Unfortunately, the material needs to be in contact with a person's skin for at least 20 minutes before an accurate measurement can be done. Few people would be willing to sit patiently for 20 minutes waiting for a blood test to be performed! Another disadvantage is that Benjisponge gradually decomposes (breaks up) when it comes into contact with air, so that after 8-10 hours it can no longer be used.

One morning, while feeding her dog, Emily came up with a brilliant idea on how to apply her technology. She wants to create a pair of headphones that can be plugged into any standard MP3 player or walkman. This is illustrated in the Figure on the next page. By putting a layer of Benjisponge on the external surface of the headphone and embedding a sensor within it, she can turn the headphone into an instrument for capturing data about the person's blood. The headphones are connected to a little box filled with electronics that analyze the results of the blood test. Parameters such as blood-sugar level, temperature and oxygen-saturation level can be captured. Patients suffering from diabetes, AIDS and other diseases that require regular blood tests would surely appreciate his invention. "No more needles needed for blood tests!" they would say. It would be painless, and few patients would mind listening to music for 20 minutes while their blood is being tested. This idea also solves the problem of Benjisponge's degradation due to air exposure. The Benjisponge can be sold separately as a disposable headphone cover. Furthermore, the skin around a person's ears is rather thin, allowing a fairly accurate measurement to be made.

After discussing her idea with you and discovering that you know a lot about becoming an entrepreneur, Emily proposes that you jointly start a company. She can do the science while you focus on the commercialization strategy.

- 2.1 Discuss whether patents, copyrights, and other forms of intellectual property would be useful (or not) in protecting Emily's invention. Explain your answer. (15 marks)

After thinking over Emily's idea, you came up with an improvement. Why not include both an MP3 player and the electronics for monitoring the blood test results into a single box? That way, a person does not need to carry around two separate devices.

- 2.2 Analyze the advantages and disadvantages of this proposal. What are the challenges that you might face and how would you overcome them? (Hint: think about complementary assets as well as possible alliances) (15 marks)

Last week, you attended a conference on medical devices and realized that you could further enhance the electronic analyzer box to store and transmit data about the patient over a period of time. This way, the device can alert a hospital through the patient's mobile phone in the case of a medical emergency, or it could allow the patient to download the data into a personal computer in order to analyze his/her medical history. At the conference, you met many other people making all sorts of other medical and fitness-related devices that need to communicate with handphones and personal computers. But as yet, there is no standard or dominant design in the way such devices might communicate with other devices. It would be nice if a standard language exists for transmitting such information, or if a fixed data standard were accepted.

2.3: Describe with reasons the process that you would take to establish such a standard?  
(5 marks)

2.4 Compare and contrast your approach with that taken by NTT Docomo and IBM(LINUX) in the case studies covered in TR2202.  
(15 marks)

