

**MNE3703
MNE3033**

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INNOVATION AND TECHNOLOGY

Duration 2 Hours

70 Marks

EXAMINERS

FIRST

SECOND

EXTERNAL

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Use of a non-programmable pocket calculator is permissible.

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The paper consists of 6 pages

You may answer this examination paper in either English or Afrikaans.

Make sure that the following information appears on the cover of your answer book:

- Your **student number**
- The **module code (MNE3703/MNE3033)**
- The **sections and the numbers** of the questions you have answered

Section A is a compulsory section which you have to answer. In Section B you must answer any two of the three questions.

Answer the questions in the answer book provided to you.
Please indicate the section and number of the question clearly when answering.

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SECTION A

The completion of this section is compulsory. Answer all the questions in this section of 30 marks.

QUESTION 1

Read the case study and then answer the questions that follow.

CASE STUDY. FLASH OF GENIUS

Marc Abraham's recent film "*Flash of Genius*" tells the story of Bob Kearns, the inventor of the intermittent windscreen wiper and his battle to capture the value of his invention. The film begins in 1962 when Kearns was driving his Ford Galaxie in Detroit. Light rain caused the wipers to screech back and forth across the windscreen. Hearing the noise Kearns had his flash of genius – why can't wipers work like eyelids with a blinking action? Working at home in his basement Kearns devised an electronic timer for the wiper comprising a transistor, a capacitor and a variable resistor. When the voltage in the capacitor reached a certain level, the transistor turned on and the wiper wiped the windscreen. Running the wiper motor drained voltage out of the capacitor turning the transistor off and breaking the circuit thereby switching the wiper motor off after a single wipe. The wiper remained static until the capacitor recharged and the cycle began again. Having patented this innovation with the help of a friend, Kearns showed it to engineers at Ford. They had been working on a similar device but based on vacuum technology rather than electronics. Ford's engineers were enthusiastic. Kearns was told the new wiper would be incorporated into next year's model and he began to plan to put it into production. Then quite suddenly Ford said it wasn't interested in the technology after all. Kearns was devastated. Over time shock turned to anger when Ford models began to appear with an intermittent wiper. Other manufacturers followed suit. As the film shows it was to take Kearns 20 years of legal battles but eventually in 1990 a jury ruled that Ford has infringed Kearns' patent, and the car giant agreed to pay him \$10.2 million (Source. Exploring Innovation, Smith, 2010:13)

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1. Recognition of multiple sources of innovation reflects the changing nature of innovation and the changing context within which it takes place (Smith 2010:88).
- 1.1 Who or what was the source of Bob's innovation? (1)
- 1.2 Provide reasons why users are increasingly becoming the source of innovations. (3)
- 1.3 Value creation and value capture are key aspects of business models. Which three business models were identified by Chesbrough (2003a) to enable firms to convert technological potential (i.e. inventions) into economic value? (3)
- 1.4 Inventions may be technically very sophisticated and result in what are technically great products but, as Chesbrough reminds us "There is no inherent value in technology per se". The economic value of technology remains latent until it is commercialised in some way. A business model serves the dual function of enabling value capture and value creation.
 - 1.4.1 How long did it take for Bob to capture the value of his innovation? Motivate your answer with an appropriate fact from the case study. (1)
 - 1.4.2 What was the value of Bob's innovation in 1990? (1)
- 1.5 Which methods of bootstrapping did Bob use? Motivate your answer with appropriate fact(s) from the case study. (2)
- 1.6 One of the problems with any form of intellectual property is that the greater the potential value, the stronger the incentive for others to copy it in order to reap some form of commercial gain (Smith 2010:131)
 - 1.6.1 Define what a patent is. (2)
 - 1.6.2 What is the lifespan of a patent in South Africa? (1)
- 1.6.3 Describe the purpose of a patent for the owner of the patent. (2)
- 1.6.4 Why was it important for Bob to register a patent? Use appropriate facts from the case study to motivate your answer. (2)
- 1.7.1 Which category of technical entrepreneur would you say Bob is? Use appropriate facts from the case study to motivate your answer. (2)

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- 1.7.2 What would you say was Bob's strength as a technical entrepreneur? Motivate your answer with some of the features of technical entrepreneurs as suggested by Autio (1995) and appropriate facts from the case study (2)
- 1.8 There are three models (routes) that describe how the invention phase of innovation can be undertaken.
- 1.8.1 Describe the three routes to invention. (6)
- 1.8.2 Which route did Bob Kearns follow for his idea to become an invention? Motivate your answer with appropriate facts from the case study. (2)

[30]

SECTION B

You may choose to answer any **two** of the following three questions in this section of 20 marks each.

QUESTION 2

- 2 The term technological paradigm borrows heavily from science and refers to examples such as nuclear technologies, semiconductor technologies and organic chemistry technologies (Smith 2010:58)
- 2.1.1 How does Dosi (1982) define a technology paradigm? (1)
- 2.1.2 What is the importance of a technology paradigm? (2)
- 2.2 Theories of innovation have three main contributions to offer when it comes to the analysis of innovation, namely descriptive, analytical and predictive.
- 2.2.1 What are the benefits of the prediction of innovation theories? (3)
- 2.3 If the answer to the question about entering the market is affirmative then there are a number of potential innovation strategies that can be employed to determine when and where market entry occurs. Some of these innovation strategies, such as the first mover/pioneer strategy and late comer/follower strategies are relatively well known (Smith 2010:163)

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- 2.3.1 Define the first-mover/pioneer strategy (1)
- 2.3.2 Describe the potential benefits of a first-mover/pioneer strategy (6)
- 2.3.3 A latecomer/follower strategy has many benefits, but is also associated with risks. Identify some of the risks (disadvantages) of a firm that chooses to adopt a follower/latecomer strategy. (2)
- 2.4 According to Cesaroni (2003) the case for licensing (external route to innovation) as opposed to in-house development (internal route to innovation) as a means of exploiting a proprietary technology rests on three factors. A firm could decide that these factors mean it is not wise for the firm to exploit the innovation itself and it should instead aim to transfer the technology to a third party (Smith 2010:160)
- 2.4.1 Describe these three factors. (3)
- 2.4.2 Define what value creation is. (2)
- [20]**

QUESTION 3

- 3.1 O'Sullivan suggests that there are three particular factors that make innovation expensive. Describe these three factors. (3)
- 3.2 Few innovators are likely to have the resources to fund the whole of the innovation process. It is therefore important to understand the innovation cash flow as it could have a major impact on the success or failure of an innovation. Draw a diagram to depict the innovation cash flow. (10)
- 3.3 What is meant by the term "business angel"? (2)
- 3.4 Explain how "business angels" can contribute to the process of innovation. (3)
- 3.5 Why are personal networks often important when it comes to funding innovation? (2)
- [20]**

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QUESTION 4

- 4 1 Innovation appears to be something of a spontaneous activity that cannot be managed. There are many features of the context within which innovation takes place that make effective management essential. Discuss the five contextual factors that make effective management of innovation essential. (10)
- 4 2 Several practices and schemes have been developed to enable employees to contribute actively to innovation. Describe three of such practices or schemes. (6)
- 4 3 The typology of internal corporate venturing according to Tidd and Taurins (1999) include four arrangements. Define a "dedicated business unit" arrangement. (2)
- 4 4 How can corporate culture have a profound effect on innovation? (2)
- [20]**

TOTAL MARKS:

[70]