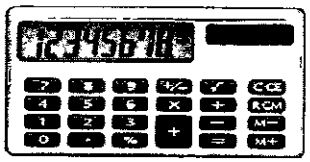
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

MNE3703

May/June 2013

INNOVATION AND TECHNOLOGY

Duration 2 Hours

70 Marks

EXAMINERS

FIRST	MS MB VAN EEDEN
SECOND	DR D VISSER
EXTERNAL	PROF M PRETORIUS

Use of a non-programmable pocket calculator is permissible

Closed book examination

This examination question paper remains the property of the University of South Africa and may not be removed from the examination venue

The paper consists of 5 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)**
- 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 (2)** of the three (3) questions.

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

[TURN OVER]

SECTION A

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

QUESTION 1 (COMPULSORY)

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

ARM HOLDINGS: A successful implementation of external routes to commercialise innovations

Acorn Computer was a British computer firm that was among the first to develop a commercial Reduced Instruction Set Computer (RISC) processor or chip. The RISC chip is a central processing unit (CPU) that exchanges versatility for processor speed. Essentially the CPU executes a reduced number (i.e. set) of commonly used instructions very fast, thereby enhancing the overall speed of the processor Hitherto CPU's employed a Complete Instruction Set Computer (CISC) chip that got the hardware of the CPU to do as much as possible per instruction. RISC technology operates on a quite different basis with simple instructions that get the CPU to do less per instruction.

To develop its RISC technology Acorn decided to create a spin-off company by forming a joint-venture, ARM Holdings, with Apple Computer of the US, which was keen to use the new technology in its Newton notepad Unlike other chip manufacturers such as Intel and Motorola, ARM Holdings chose to exploit the new technology in a very particular way. It became in the words of its managing director Robin Saxby, "a chipless chip company" (Garnsey, Lorenzoni & Ferriani, 2008. p 217).

By licensing, rather than manufacturing and selling RISC chip technology, the company established a new business model that redefined the way in which microprocessors were designed, built and sold. Licensing meant that ARM Holdings could focus on design work as a core activity, leaving others to undertake manufacturing.

It also enabled ARM Holdings to quickly establish a market presence that in turn enabled the company to exercise a very powerful influence over the sorts of microprocessors used in a variety of consumer products including. automotive, entertainment, imaging, security and wireless applications Among the everyday items using ARM Holdings' RISC technology are mobile phones, digital cameras, DVD players, smart cards, set-top boxes, SIM cards, scanners and desktop printers. Some 80 percent of the mobile phones shipped worldwide utilise ARM technology All this from a company that makes nothing; preferring instead to license its technology.

Among the companies who are licensees of ARM technology are such household names as Motorola, Philips, Sharp, Sony and Texas Instruments, as well as a large number of specialist manufacturers of computer peripherals and similar devices ARM Holdings now has a turnover of £250 million and employs more than 1,650 people in design centres in the UK, France and the US. (Source: Smith, 2010.161-162)

1.1 An innovator could use internal or external routes to exploit an innovation. ARM Holdings chose one (licensing) of three available external routes

Describe two (2) external routes, other than licensing, which ARM Holdings could have used to commercialise its innovation. (2)

1 2 Provide appropriate extracts from the case study which show the benefits ARM Holdings derived from licensing its technology (4)

1 3 Give four (4) benefits for a licensor of technology that are not mentioned in the case study. (4)

1.4 Henderson and Clark (1990) use the distinction between component and system knowledge to differentiate four categories or types of innovations.

Explain which type of innovation best represents the RISC technology. (4)

1.5 Motivate your choice of innovation type in 1.4 with appropriate extracts from the case study. (4)

1 6 Define the form of intellectual property right which ARM Holdings would have used to license its technology (2)

1.7 Discuss two (2) functions which a business model performs to enable successful exploitation of innovations. (6)

1 8 What would you say is an indication that ARM Holdings has successfully commercialised its RISC technology? Motivate your answer with appropriate extracts from the case study (4)

[30]

SECTION B

You may choose to answer any **two (2)** of the following three questions of 20 marks each in this section.

QUESTION 2

2 1 Define three (3) models (or routes) which describe how the invention phase can be undertaken (6)

2 2 Discuss how an existing technology paradigm impacts an industry and existing and new competitors (4)

2.3 The innovation process consists of three stages, namely invention, commercialisation and diffusion

Explain the nature and importance of diffusion with regards to the process and success of an innovation. (4)

2 4 Provide six (6) implications (or functions) of the long wave cycle on innovation and technological change (6)

[20]

QUESTION 3

3.1 Theories of innovation have three main contributions to offer when it comes to analysing innovation, namely descriptive, analytical and predictive

Explain three (3) benefits of the predictive contribution of innovation theories. (3)

3 2 The following four theories are associated primarily with technological innovation: the technology S-curve, the punctuated equilibrium, dominant design and absorptive capacity.

Discuss three (3) critical factors of the theory of absorptive capacity (6)

3 3 Define sunk costs in the context of innovation. (1)

3.4 Explain how sunk costs affect the innovation technology strategy and decisions of an organisation (2)

3 5 The seven steps of the generic model of the innovation process include a development stage under which prototypes are developed

Describe the nature of prototypes (2)

3.6 Show the importance of prototypes by discussing four (4) benefits that prototypes contribute to the innovation process (4)

3.7 Give two (2) benefits a patent holder may receive by registering a patent. (2)

[20]

QUESTION 4

4 1 According to Cesaroni (2003) the case for licensing as opposed to in-house development as a means of exploiting a proprietary technology rests on three factors

Explain three (3) factors that an organisation should consider in its decision between licensing and exploiting the innovation itself (6)

4.2 Define a side-entrance strategy. (2)

4 3 Describe four (4) benefits of a side-entrance strategy. (4)

4 4 Few innovators are likely to have the resources to fund the complete innovation process It is therefore important to understand the impact that a cash flow gap could have on the success of an innovation.

Discuss the importance of managing the cash flow gap with regards to the impact of the cash flow on the innovation process and the success of the innovation. (4)

4 5 Innovation appears to be something of a spontaneous activity that cannot be managed, but there are many features of innovation that requires effective management

Describe four (4) features or contextual factors of the innovation process that make effective management of this process essential. (4)

[20]

TOTAL MARKS: **[70]**