S228/208C

DUBLIN INSTITUTE OF TECHNOLOGY

DT228 BSc. (Honours) Degree in Computer Science

Year 2

SUMMER EXAMINATIONS 2015/2016

HUMAN COMPUTER INTERACTION [CMPU2008]

DR. ART SLOAN
DR. DEIRDRE LILLIS
MR. PAUL COLLINS

TUESDAY 10TH MAY 4.00 P.M. – 6.00 P.M.

TWO HOURS

ANSWER **QUESTION (1)** AND **ANY TWO** OTHER QUESTIONS

QUESTION (1), CARRIES **40** MARKS.
QUESTIONS (2), (3), AND (4) CARRY **30** MARKS EACH.

Q1. (a) Why should a distinction be made between *novice* and *expert* users when designing computer interfaces?

(6 marks)

(b) The job or task of the user must be understood prior to system design. Describe *five* methods a designer might use to do this.

(10 marks)

(c) It is suggested that if designers want to create memorable interface components they should model them on highly familiar items. What problems might be encountered using this approach? **(5 marks)**

(d) Explain how the principle of *affordance* can be used to enhance the design of an interface.

(4 marks)

(e) A blind user who is unable to use a standard keyboard requires an alternative way of interacting with a computer. Choose *two* alternative input technologies that may be suitable for use by the user and explain how the nature of the user's impairment may influence your choice of input technologies.

(7 marks)

(f) Describe a simple test which may be used to show how humans use *automatic processing* when processing familiar information. Briefly explain the relevance of automatic processing when designing a system interface.

(8 marks)

Q2. (a) A new electronic ticketing system has been commissioned that will be used at railway stations for quick and easy purchase of train tickets.

(i) Recommend a suitable *lifecycle model* that should be used to develop the system. **(6 marks)**

(ii) Recommend an appropriate *interaction style* for the system. **(5 marks)**

(iii) Recommend appropriate *input and output device(s)* for the system, explaining the reasons for your choice. **(11 marks)**

Give a clear indication of the rationale for your recommendations in *(i)*, *(ii)*, and *(iii)*, and for the alternative option(s) that you have rejected.

(b) Describe how any *two* of Nielsen's usability principles may be applied to improve the usability of the electronic ticketing system described in Part (a). Use specific examples to support your answer. **(8 marks)**

Q3. (a) Define the terms *user interface* and *usability*. **(5 marks)**

(b) Some interfaces may cause interaction problems for their users. Such problems may be described using Norman's concepts of the *gulf of execution* and the *gulf of evaluation.* Briefly describe the gulf of execution and the gulf of evaluation and indicate how an interface designer can bridge these gulfs for effective human-computer interaction. **(7 marks)**

(c) The Principles of Universal Design define seven principles that can be used to guide the design process of computer systems. Briefly explain the concept of Universal Design and describe how *any five* of the design principles can be used to guide the design of an Automated Teller Machine (ATM). Include *at least one* specific design suggestion for each of the five principles that you use. **(18 marks)**

Q4. (a) List *four* techniques that may be used to focus user *attention* on information displayed on a computer screen. **(8 marks)**

(b) Learning through *analogy* is one of the main learning approaches taken by users when learning to use new computer systems.

(i) Explain how users learn through *analogy*. **(4 marks)**

(ii) Indicate how learning through analogy can be facilitated within computer systems design. **(2 marks)**

(iii) Describe how learning through analogy is supported by the Graphical User Interface (GUI). **(3 marks)**

(c) The Key Stroke Level Model (KLM) is to be used to develop numerical predictions of user performance of a new system. Using the operator steps and times provided in Table 1, estimate the time that will be taken by an experienced computer user to enter the following information into a text box on the screen:

"Position tracking log is open"

Explain any assumptions made in your calculations. **(13 marks)**

Operator	Description	Time (sec)
K	Pressing a single key or button Average skilled typist (55 wpm) Average non-skilled typist Pressing shift or control key Typist unfamiliar with keyboard	0.35 0.22 0.28 0.08 1.20
P P1 D	Pointing with a mouse or other device on a display to select an object Clicking the mouse of similar device Draw a line with a mouse	1.10 0.20 Variable
H	Bring "home" hands on the keyboard or other device	0.40
M	Mentally prepare/respond	1.35
R(t)	System response time is counted only if it causes the user to wait	T

Table 1