UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

Foundation Examination 2015

IS50004A
Study skills and introduction to the use of computers

Duration: 2 hours 15 minutes

Date and time:

There are five questions in this paper. You should answer no more than THREE questions. Full marks will be awarded for complete answers to a total of THREE questions. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 75 marks available on this paper.

No calculators should be used.

**THIS PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM**

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QUESTION 1.

a) Explain what is meant by a *register* in the context of computer architecture, and describe three kinds of register.   **[6 marks]**

b) Explain what is meant by "pipelining" in the context of instruction execution.
                                                                                [6 marks]

c) Explain the need for *cache memory* in a CPU.   **[5 marks]**

d) What is the preferred character-set encoding for email and web pages? Describe some important differences between this encoding and the original ASCII character set.   **[8 marks]**

QUESTION 2.

a) Explain the concept of **layering** in networked computing, and describe the five layers of the TCP/IP stack.
                                                                                [8 marks]

b) Which TCP/IP layers do the following protocols belong to? Briefly state the functions defined for each protocol, for instance *IMAP: Application layer email protocol which keeps all messages on server*.

  i.   HTTP
  ii. TCP
  iii. DHCP
  iv. DNS

                                                                                [8 marks]

c) Explain the difference between positive and negative acknowledgements in the context of networked computing. How does the TCP protocol use acknowledgements to support reliable data transmission?
                                                                                [9 marks]

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QUESTION 3.

a) Explain what is meant by (i) *paging* and (ii) *swapping* and why these operations may be necessary.

[8 marks]

b) List three other functions of an operating system's Resource Manager apart from paging and swapping.

[3 marks]

c) Explain what is meant by (i) *logic gates* and (ii) *logic circuits* in computer architecture.

[4 marks]

d) Draw a circuit diagram for a full one-bit adder as a combination of Boolean operations. Show how the outputs are calculated from inputs A = 1, B = 0, Carry_In = 1.

[10 marks]

QUESTION 4.

a) Explain what is meant by the following terms in the context of data protection:
   i. Data subject
   ii. Data controller
   iii. Sensitive personal data

[6 marks]

b) List the four main classes of intellectual property recognised by the UK Intellectual Property Office. Which of these do you think is most appropriate for safeguarding intellectual property rights in computer software? Justify your answer.

[10 marks]

c) Why is it important for website designers to ensure that their content can be accessed by people with disabilities? Describe two features that can make web pages more accessible.

[9 marks]

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QUESTION 5.

a) Explain what is meant by each of the following terms in the context of networked computing:

     i. User agent
    ii. Process
   iii. Socket
   iv. User-server state

[6 marks]

b) Briefly describe the difference between client-server and peer-to-peer architectures for networked applications.

[6 marks]

c) Identify the components of the following (fictive) URL.

```
https://groceries.co.uk/fruit.html#apples
```

[4 marks]

d) Which of the following types of application require the services provided by TCP as an underlying transport protocol, and which can be run over UDP? Justify your answer.

     i. Email
    ii. World Wide Web
   iii. Internet telephony (such as Skype)

[9 marks]

END OF EXAMINATION

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