

THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALL



**UNIVERSITY
OF LONDON**

CM1030

BSc EXAMINATION

COMPUTER SCIENCE

How Computers Work

Wednesday 4 September 2019 : 10.00 – 12.00

Time allowed: 2 hours

DO NOT TURN OVER UNTIL TOLD TO BEGIN

INSTRUCTIONS TO CANDIDATES:

This examination paper is in two parts: part A and part B. You should answer **ALL** of question 1 in part A and **TWO** questions from part B. Part A carries 40 marks, and each question from part B carries 30 marks.

If you answer more than **TWO** questions from **PART B** only your first **TWO** answers will be marked.

All answers must be written in the answer books, answers written on the questions paper will not be marked. Candidates may write notes in their answer book. Any notes or additional answers in the answer book(s) should be crossed out.

The marks for each part of a question are indicated at the end of the part in [.] brackets. There are 100 marks available on this paper.

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UL19/0830

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TURN OVER

Part A

Multiple choice

Question 1

For each part, select only ONE answer.

- (a) When transmitting text over the internet, how would each letter be represented? [4]
- a) a bit pattern
 - b) a number
 - c) pulses of light in an optic fibre
 - d) all of the above
- (b) How is an image affected when it is compressed using a lossy compression algorithm [4]
- a) it has fewer pixels
 - b) it loses small details
 - c) it uses a smaller range of colours
 - d) All of the above
- (c) What is a register? [4]
- a) memory storage as part of the CPU
 - b) a small memory storage that is physically near the CPU and can communicate to it quickly
 - c) the main memory chip of the computer
 - d) a device for long term data storage, for example a hard disc
- (d) Which machine instruction would be used by an application to load code from a software library? [4]
- a) MEMLOAD
 - b) VALLOAD
 - c) STORE
 - d) JUMP

- (e) Which of these is part of the operating system kernel? [4]
- a) system utilities
 - b) memory manager
 - c) window manager
 - d) none of the above
- (f) If your computer is slowing down due to memory paging, what would be the best way of upgrading it? [4]
- a) buy a faster CPU
 - b) buy more cache
 - c) buy more RAM
 - d) buy a bigger hard disc
- (g) Which of these is typically part of a web server? [4]
- a) a router
 - b) a database
 - c) a browser
 - d) an ISP
- (h) Which of the following is an IP address? [4]
- a) www.gold.ac.uk
 - b) jblog001@gold.ac.uk
 - c) 158.223.43.141
 - d) 0x10AF341C

- (i) A jpeg image file is loading too slowly over the internet. Which of the following would improve load times? [4]
- a) using TCP instead of UDP
 - b) using HTTPS instead of HTTP
 - c) using lossless compression instead of lossy compression
 - d) using a plain white background instead of the background in the photo
- (j) What is the output of machine learning classification? [4]
- a) one of several categories
 - b) a number
 - c) several numbers
 - d) an image

Part B

Question 2

- (a) Name three parts of a CPU [6]
- (b) Describe the run length encoding algorithm [8]
- (c) Imagine scanning a written document, like this exam paper, to send by email. Describe how the data is transferred from the scanner and how it would be represented in a file. [16]

Question 3

- (a) What is a semaphore, why is it needed? [5]
- (b) Name and describe three types of security threat. [9]
- (c) You are going to visit your friend in a part of London you have never visited before. On leaving the nearest station, you pull out your phone to find the way to your friend's house. Describe the technologies that enable you to find the right route. [16]

Question 4

- (a) Describe how you would test a machine learning model [6]
- (b) Describe what PANs, LANs and WANs are and what each is used for [8]
- (c) Describe what happens behind the scenes when you buy an item of clothing from an online store. [16]

END OF PAPER