

GX 1604

| | |
|----------------------|---|
| Exam Code(s) | 1IF1, 1BO1 |
| Exam(s) | First Year Information Technology First Year Biomechanical Science |
| Module Code(s) | CT101 |
| Module(s) | Computing Systems |
| Paper No. | 1 |
| Repeat Paper | |
| External Examiner(s) | Professor Paddy Nixon |
| Internal Examiner(s) | Professor G. Lyons Dr. Aaron Golden Mr. P. Bigioi |

Answer any 4 questions.
Use a separate answer book for each section.
All questions will be marked equally.

| | |
|---------------------|------------------------|
| Duration | <u>3 hrs</u> |
| No. of Answer Books | <u>2</u> |
| No. of Pages | <u>3</u> |
| Department(s) | Information Technology |

Section A (Questions 1 to 3)

Question 1

- a) Describe the principal functions of the Operating System. 8 MARKS
- b) Compare and contrast command line user interfaces and graphical user interfaces, outlining the advantages and disadvantages of each. 8 MARKS
- c) What is meant by the following terms in the context of resource allocation for an Operating System:
- deadlock
 - critical region
 - spooling

9 MARKS

Question 2

- a) With the aid of examples, distinguish between sequential, indexed and hashed file organisation 8 MARKS
- b) What is meant by file compression and why is it necessary? 8 MARKS
- c) What are search engines? Discuss the principal features of the most commonly used search engines used today. 9 MARKS

9 MARKS

Question 3

- a) What is meant by the term "software engineering"? Outline the phases involved in the software development life cycle. 8 MARKS
- b) Explain the functionality of the following protocols:
- SMTP
 - HTTP
 - FTP
- c) Why is encryption regarded as especially important in contemporary Internet applications? Given the following message: "*quis custiodet ipsos custiodes*", outline a simple technique to encrypt it, and how would somebody go about de-coding it. 8 MARKS

9 MARKS

Section B (Questions 4 to 6)

Question 4

- a) Describe both AND and OR logic gates, in terms of symbols and truth tables.
7 MARKS
- b) Given the three input variable function: $f(X_2, X_1, X_0) = X_2X_1'X_0' + X_2'X_1'X_0 + X_2'X_1X_0 + X_2X_1X_0'$. Determine the minimum form of the function using Karnaugh maps. Implement the function using basic logic gates.
10 MARKS
- c) Implement the above function using ROM.
8 MARKS

Question 5

- a) Convert the binary number 10111011 to hexadecimal form. Convert the same number to its decimal form. Compare results by performing the conversion from hexadecimal to decimal.
7 MARKS
- b) Convert the fractional decimal number 0.34854 to base its binary representation (base 2). Use maximum 16 bits precision.
8 MARKS
- c) How many bits do you need to represent the positive number 222 in binary form? Why? What is its representation in two's complement, using 10 bits? Represent the negative number -222 in two's complement using 10 bits.
10 MARKS

Question 6

- a) Describe the main types of memory. Describe the basic memory operation. How many address lines and data lines would have a 512X8 memory chip?
7 MARKS
- b) Describe (draw) the basic computer organization, describe the operation and role of each of the subsystems (buses, central processing unit, memory and I/O subsystems).
10 MARKS
- c) Describe (draw) the typical organization of the CPU and functions performed by each of its sub-systems (internal buses, Control Unit, ALU and Registers). Describe the fetch-decode-execute cycle.
8 MARKS