



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INFORMATION TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE : ITD 12203
COURSE NAME : COMPUTER ARCHITECTURE
PROGRAMME NAME : DIPLOMA IN INFORMATION TECHNOLOGY
DATE : 25 MAY 2016
TIME : 2.00 pm – 4.30 pm
DURATION : 2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** questions in Section A and Section B.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English language **ONLY**.

THERE ARE 9 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 25 marks)

INSTRUCTION: Answer ALL questions.

Please use the objective answer sheet provided.

1. From the user's point of view, the purpose of the computer is to _____.
 - A. perform useful work
 - B. make reports and spreadsheets
 - C. create user-friendly databases
 - D. make documents in a word processor

2. The processing that takes place when you purchase a product at a store that uses an on-line credit purchasing system includes _____.
 - A. updates the store inventory
 - B. uses built-in rules to detect obvious errors
 - C. verifies the cost of the product
 - D. adds commissions to the sales staff

3. The types of operations computers can perform can be best stated as _____.
 - A. extremely complex operations repetitively
 - B. simple calculations, sorting, comparisons and simple decisions repetitively
 - C. complex calculations, sorting, comparisons, simple decisions repetitively
 - D. addition, subtraction, multiplication, division and comparisons

4. The part of the operating system that interfaces with the API, file system, networking and I/O is known as _____.

A. the kernel module	C. the Hardware OS component
B. the primary OS component	D. the Application OS component

5. A NIC card _____.
 - A. establishes a protocol with International Communication Standards
 - B. provides the hardware and software communication components
 - C. interfaces the computer and communications channel
 - D. used to connect computers at long distances

6. The number system of choice, both for data storage and for all internal processing of operations is _____.
- A. binary
B. decimal
C. octal
D. hexadecimal
7. Which technology is used at grocery checkout counters?
- A. Optical character recognition
B. Image scanner
C. Magnetic stripe reader
D. Bar code reader
8. The range of integers that can be stored is determined by _____.
- A. the sign of the number
B. the number of digits past the decimal point
C. the number of bits used to store the integer
D. the Operating Software
9. The Control Unit contains the following registers:
- A. execution time, instruction, PSW and memory data
B. execution, instruction, PSW and memory data
C. program counter, instruction, memory address and memory data
D. execution time, instruction, memory address and memory data
10. Memory is composed of _____.
- A. 1-bit cells and each cell is addressable
B. 16-bit cells and each cell is addressable
C. rows of 8-bit cells where each bit is addressable
D. rows of 8-bit cells or more and only addressable in rows
11. Status registers use _____ to communicate problems.
- A. an 8-bit super-fast registers
B. flags
C. floating point values
D. integer values

12. When retrieving or storing data at a particular memory location, the first step in the CPU memory interaction is to _____.
- A. allocate the MAR the necessary number of bits to retrieve the address line
 - B. transfer data from some register to the MDR (for a WRTE) OR transfer data from the MRD to some register (for a READ)
 - C. send a message to the Control Unit stating there is a READ (or WRITE condition)
 - D. copy an address from some register to the MAR
13. In a small system, most of the I/O modules are _____ that as direct interfaces between the system bus and each of the peripheral devices.
- A. DMA controllers
 - B. device controllers
 - C. PCI based interface controllers
 - D. USB controllers
14. The disk controller is responsible for _____.
- A. moving the data to and from CPU registers
 - B. accessing memory directly
 - C. changing the speed of the disk to account for differing data rates
 - D. moving the w/r heads to the correct position, and buffering data transfers
15. DVD-ROMs, graphics scanners, video cameras and other devices can be connected to the computer through one of several _____.
- A. high speed ports
 - B. parallel channels
 - C. serial channels
 - D. serial ports
16. The two basic I/O system architectures in common use are _____.
- A. frequently used buses and I/O addresses
 - B. bus and channel architectures
 - C. CMOS and channel architectures
 - D. bus and CMOS architectures
17. The cathode Ray Tube or CRT uses _____ and _____ to display an image.
- A. lasers; phosphors
 - B. an electron gun; lasers
 - C. shadow masks; lasers
 - D. an electron gun; phosphors

18. A _____ displays pixels in whatever order is necessary to trace the out a particular image.
- A. vector scan
B. raster scan
C. variable scan
D. fixed scan
19. There are _____ arbitrary combinations of red, greens and blues to divide the 8-bits of color.
- A. 64
B. 128
C. 740
D. 256
20. In the operation to find a block of data, the values for _____ and _____ are actually averages.
- A. seek time; transfer time
B. seek time ; latency time
C. rotational delay; latency time
D. transfer time ; latency time
21. Using 5-bit 2-complement numbers, what is the outcome of adding (-11 = 10101) and (-7 = 11001):
- A. no overflow and no carry
B. overflow and no carry
C. no overflow but need to carry
D. both overflow and carry
22. The sign and magnitude of the three digit number 800, with 10's complement notation is _____.
- A. 800
B. 199
C. -800
D. -200
23. In one's complement, using 8 bits to store values, what is the sign and magnitude of 00011001?
- A. 25
B. -25
C. 50
D. -50

24. A number such as .0000287 is first written as _____.
- A. $.287 \times 10^{-4}$ C. 2.87×10^{-5}
B. $.0287 \times 10^{-3}$ D. $.287 \times 10^{-5}$
25. The floating point representation of 54877532 is _____.
- A. -77.532 C. +.0077532
B. 77532 D. -.0077532

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SECTION B (Total: 75 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet given.****Question 1**

- (a) Understanding the computer system's operations has an immediate benefit because it allow user to use the machine more effectively. If you are a user, explain why you need to understand the computer system and define computer system. (5 marks)
- (b) Data moves between the various I/O modules, memory, and the CPU in similar fashion by using bus. Define bus and describe **TWO (2)** types of bus connection by giving an example for each type of bus. (8 marks)
- (c) There are many circumstances under which it would be desirable to interrupt the normal flow of a program in the computer to react to special events such as an unexpected user command from the keyboard or other external input. The way in which an interrupt is used depends on the nature of the device. Discuss **FOUR (4)** different ways in which interrupts are used. (8 marks)
- (d) Differentiate between *average seek time* and *latency time* operation in the process of locating an individual block of data on the magnetic disc. (4 marks)

Question 2

- (a) Add the following decimal numbers by converting each to five-digit 10's complementary form, adding, and converting back to sign and magnitude.

i.
$$\begin{array}{r} 24379 \\ \underline{5098} \end{array}$$

(3 marks)

ii.
$$\begin{array}{r} -24379 \\ \underline{5098} \end{array}$$

(4 marks)

- (b) Convert the following numbers to the format **SEE M M M M**, with the exponent stored **excess-40**. The implied decimal point is at the beginning of the mantissa. The sign is 2 for a positive number, 9 for a negative number.

i. -35.723

ii. 123.57×10^{-15}

(6 marks)

- (c) The following decimal numbers are stored in **excess-50** floating point format, with the decimal point to the left of the first mantissa digit. Perform the arithmetic and present the results in standard decimal **sign-and-magnitude notation**.

i. Multiply:

$$\begin{array}{r} 05452500 \\ 04822200 \\ \hline \end{array}$$

ii. Addition:

$$\begin{array}{r} 05225731 \\ 04833300 \\ \hline \end{array}$$

iii. Subtraction:

$$\begin{array}{r} 05199520 \\ 04967850 \\ \hline \end{array}$$

(12 marks)

Question 3

The Little Man Computer (LMC) is an instructional model of a computer, created by Dr. Stuart Madnick in 1965. The LMC is generally used to teach students, because it models a simple von Neumann architecture computer - which has all of the basic features of a modern computer. It can be programmed in machine (usually in decimal) or assembly code.

(a) Describe the instructions that LMC perform as the following:

- i. Opcode 6
- ii. Opcode 1
- iii. Opcode 8
- iv. Opcode 0

(8 marks)

(b) Explain the detail process of the following LMC instructions:

- i. 549
- ii. 287

(4 marks)

(c) Suppose that the following instructions are found at the given location in memory:

Program Counter :35

Accumulator: 114

Memory Location :

35 STO 67

36 SUB 68

67 737

68 012

- i. Display the contents of the *IR*, the *PC*, the *MAR*, the *MDR* and *A* for instruction 35.

(6 marks)

- ii. Display the contents of the *IR*, the *PC*, the *MAR*, the *MDR* and *A* for instruction 36.

(6 marks)

(d) Identify **TWO (2)** steps of the LMC instruction cycle.

(1 mark)

END OF EXAMINATION PAPER