UNIRAZAK
UNIVERSITI TUN ABDUL RAZAK

FINAL EXAMINATION

MARCH 2024

COURSE TITLE	**COMPUTER ORGANIZATION AND ARCHITECTURE**
COURSE CODE	**RCIT3143**
DATE/DAY	**20 JUNE 2024 / THURSDAY**
TIME/DURATION	**02:00 PM - 04:00 PM / 02 Hour(s) 00 Minute(s)**

INSTRUCTIONS TO CANDIDATES :

1. Please read the instruction under each section carefully.
2. Candidates are reminded not to bring into examination hall/room any form of written materials or electronic gadget except for stationery that is permitted by the Invigilator.
3. Students who are caught breaching the Examination Rules and Regulation will be charged with an academic dishonesty and if found guilty of the offence, the maximum penalty is expulsion from the University.

(This Question Paper consists of **7** Printed Pages including front page)

*****DO NOT OPEN THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO*****

This question paper contains TWO (2) sections in this examination paper. Please answer ALL questions in the answer booklet. [50 MARKS]

SECTION A (20 Marks)

There are TWENTY (20) questions on this part of the examination paper. Answer ALL questions in the answer booklet.

1. The tangible part of a computer system is called _____.

   A. Input data
   B. Output data
   C. Hardware
   D. Software

2. Hexadecimal numbers are a mixture of _____.

   A. Octal and decimal numbers
   B. Binary and octal numbers
   C. Letters and decimal digits
   D. Binary and decimal numbers

3. Which of the following computer memory is the **FASTEST**?

   A. Register
   B. Hard disk
   C. RAM
   D. None of the mentioned

4. Which of the following computer memory is used to speed up the computer processing?

   A. Cache memory
   B. RAM
   C. ROM
   D. None of the mentioned

5. Which of the following method is used to carry out subtraction process in computers?

   A. 1's complement
   B. 2's complement
   C. Unsigned numbers
   D. Signed numbers

6. The idea of cache memory is based _____.

   A. on the property of locality of reference
   B. on the heuristic 90-10 rule
   C. on the fact that references generally tend to cluster
   D. all of the mentioned

7. How many entries will there be in the truth table of a 4-input NAND gate?

   A. 6
   B. 8
   C. 16
   D. 32

8. How many bit(s) are needed to store one Binary Coded Decimal (BCD) digit?

   A. 1
   B. 2
   C. 3
   D. 4

9. Which of the following method offers higher speed of Input/Output transfers?

   A. Interrupts
   B. Memory mapping
   C. Program-controlled Input/Output
   D. DMA

10. Which of the following is **TRUE** about Direct Memory Access (DMA)?

    A. DMA controller has 3 registers.
    B. DMA controller acts as a processor for DMA transfers and monitor entire process.
    C. DMA is an approach of performing data transfer in bulk between memory and the external device without the intervention of the processor.
    D. All of the mentioned.

11. Which of the following mode of data transfer takes place between the CPU and Input/Output devices?

    A. Programmed Input/Output
    B. Interrupt driven Input/Output
    C. DMA
    D. All of the mentioned

12. What is it called for Input/Output that are connected to computer?

    A. Input/Output Subsystem
    B. Peripheral Devices
    C. Interfaces
    D. Interrupt

13. A _____ channel controls multiple high-speed devices and at any one time, is dedicated to the transfer of data with one of those devices.

    A. selector
    B. multiplexor
    C. repeater
    D. alternative

14. The Which of the following best describes Instruction Register (IR)?

    A. Contains the instruction most recently fetched.
    B. Contains the address of an instruction to be fetched.
    C. Contains the address of a location in memory.
    D. Contains a word of data to be written to memory or the word most recently used.

15. User-Visible Registers can be characterized into the following categories **EXCEPT**

    A. General purpose
    B. Data
    C. Address
    D. Memory

16. Which of the following best describes Program Counter (PC)?

    A. Contains the instruction most recently fetched.
    B. Contains the address of an instruction to be fetched.
    C. Contains the address of a location in memory.
    D. Contains a word of data to be written to memory or the word most recently read.

17. Which of the following best describes Memory Address Register (MBR)?

    A. Contains the instruction most recently fetched.
    B. Contains the address of an instruction to be fetched.
    C. Contains the address of a location in memory.
    D. Contains a word of data to be written to memory or the word most recently read.

18. The CISC stands for _____.

    A. Computer Instruction Set Compliment
    B. Complete Instruction Set Compliment
    C. Computer Indexed Set Components
    D. Complex Instruction Set Computer

19. The following are the Input/Output commands that an Input/Output module may receive when it is addressed by a processor **EXCEPT**

A. Control
B. Test
C. Read
D. Interrupt

20. Which of the following is/are the iconic feature of the RISC machine?

A. Reduced number of addressing modes
B. Increased memory size
C. Having a branch delay slot
D. All of the mentioned

SECTION B **(30 Marks)**

There are TWO (2) questions in this part of the examination paper. Answer ALL questions in the answer booklet.

1. Karnaugh map (K-Map) is a visual method used to simplify the algebraic expressions in Boolean functions without having to resort to complex theorems or equation manipulations. A K-map can be thought of as a special version of a truth table that makes it easier to map out parameter values and arrive at a simplified Boolean expression. Consider the following Sum of Product (SOP) form with 4 variables.

$$F\ (A, B, C, D) = \sum (0,2,5,7,8,10,13,15)$$

a) Draw the truth table for the SOP form above.

(5 marks)

b) Define the Boolean Expression truth table for SOP form in **Q1(a)**.

(2 marks)

c) Draw the K-Map and loop(s) around appropriate groups to produce an optimal SOP form for the truth table in **Q1(a)**.

(6 marks)

d) Write a simplified SOP expression based on the solution in **Q1(c)**.

(2 marks)

2. In earlier computers, the most common form of random-access storage for computer main memory employed an array of doughnut-shaped ferromagnetic loops referred to as cores. Hence, main memory was often referred to as core, a term that persists to this day. The advent of and advantages of, microelectronics has long since vanquished the magnetic core memory. Today, the use of semiconductor chips for main memory is almost universal.

a) List down **TWO (2)** types of Random-Access Memory (RAM).

(2 marks)

b) Describe the types of RAM mentioned in **Q2(a)**.

(4 marks)

c) Explain **ONE (1)** application of each type of RAM mentioned in **Q2(a)**.

(3 marks)

d) Define Programmable Read-Only Memory (PROM) in terms of category, erasure, write mechanism and volatility.

(6 marks)

***** END OF QUESTION PAPER *****