UNIVERSITY OF RUHUNA

BACHELOR OF COMPUTER SCIENCE (GENERAL) DEGREE LEVEL I (SEMESTER I)

EXAMINATION- MARCH 2024

COURSE UNIT: CSC 1122 (Computer Systems I) Duration: 2 Hours

*Answer **All** Questions.*

1)

a)

i) Wi-fi and IrDA are two new connecting technologies that can be used to connect devices to computers. Write down two (02) differences between these two technologies.

ii) Briefly explain the main purpose of a cache memory.

b)

i) Briefly explain what is known as an 'expansion card'.

ii) Give the expansion of the acronym 'ENIAC'. Write down the generation of computers ENIAC belong to, and the main technology used by ENIAC.

iii) 'A computer with a Von Neumann architecture is called a stored program computer'. Explain what is meant by a stored program computer.

c)

i) Write down the major hardware technologies in each of the four computer generations.

ii) Assume that you are asked to buy a multimedia projector for your company which can produce high quality images even viewable in a dark room. Explain which main technology you would choose for the projector and write down three (03) advantages of your selection.

2)

(a)

(i) Briefly explain "Northbridge" and "Southbridge" in a motherboard.

(ii) Write down four (04) examples for interfaces used in a personal computer.

(iii) Explain why spatial locality is important for cache memory.

(b)

(i) List down and explain the two (02) main technologies used in multimedia projectors.

(ii) Name and explain the two (02) fundamental types of software.

c)

i) Explain four (04) main functions carried out by the control unit.

(ii) Write three address instructions (Ex : ADD E, B, C) to do the following computation using only four (04) instructions.

$P = (A - B) \div (C + D \times Q)$

3)

a)

i) Processor bus, PCI bus and AGP bus are main communication pathways used in a computer. Briefly explain the main usage of these three buses in a computer.

ii) Dual inline memory modules (DIMM) have replaced single inline memory modules (SIMM) currently. Explain the main reason for this replacement.

iii) List and explain the tradeoffs between the three key characteristics of the memory hierarchy.

b)

i) Write down three (03) advantages and three (03) disadvantages of LCD screens over CRT screens.

ii) Compare between direct and random memory access methods using two (02) differences between them.

c) Suppose that an instruction is stored in two words in memory at address 301 and 302. The first part of the first word specifies the operation code and the second part of the first word specifies the mode. The second word specifies the address part. The address field has the value of 700 and the content of memory address 700 is 800. The program counter has the value 301 for fetching this instruction. Further, the content of processor register R is 200, and the index register XR is 101. Evaluate the effective address for each of the following addressing modes.

i. Direct
ii. Indirect
iii. Register indirect
iv. Relative
v. Indexed

4)

a)

i) Define an instruction cycle.

ii) "Instruction length should be equal to the memory transfer length (or data-bus length) or one should be a multiple of the other". Explain whether you agree or disagree with this statement with a justification

b)

i) Assume that a processor employs an Instruction Register, a Memory Address Register, a Memory Buffer Register, a Program Counter, and Control Unit. Explain how MAR and MBR involve in during the fetch cycle within an instruction cycle.

ii) Draw the state diagram of the instruction cycle including the fetch cycle.

c)

i) Write down three (03) differences between CISC and RISC architectures.

ii) Explain the operation of the computer in each clock cycle of a two-stage pipeline.

iii) Name the main stages of the six-stage pipeline.

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