

**FACULTY OF INFORMATION SCIENCE AND TECHNOLOGY**

Diploma in Information Technology (DIT) DCA5231 Computer Architecture

Trimester October/November 2024 [Term ID: 2430]

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**DCA5231 COMPUTER ARCHITECTURE ASSIGNMENT EVALUATION FORM**

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| --- | --- |
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**MARKING GUIDE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1 – 2.9** | **3 – 4.9** | **5 – 6.9** | **7 – 8.9** | **9 – 10** |
| **Poor** | **Average** | **Satisfactory** | **Good** | **Excellent** |

|  |  |  |
| --- | --- | --- |
| **NO** | **CRITERIA** | **MARKS** |
| **EVALUATION OF VIDEO** | | |
| 1. | **Clarity & Confidence** (e.g. *ability to demonstrate & explain the conversion of postfix notation & illustration of stack diagram*) | / 10 |
| 2. | **Video Creativity** (e.g. *ability to demonstrate creativity in the arrangement of contents in the video, voice-over or subtitle in the video, usage of appropriate*  *colours and design)* | / 10 |
| 3. | **Presenter’s Appearance & Body Language** (e.g. *ability to present with formal attire, professionalism, eye contact, hand/body gestures)* | / 10 |
| **EVALUATION OF REPORT** | | |
| 1. | **Format and organization** (e.g. *report is formatted and organized with correct font type, font size, paragraph alignment, line spacing, margin, header and footer*) | / 10 |
| 2. | **Originality & Complexity of Program Execution Expression** (e.g. *program execution expression is original and the level of complexity is high)* | / 10 |
| 3. | **Accuracy of Postfix Notation** (e.g. *postfix notation is shown in step-by-step approach and in an accurate way*) | / 10 |
| 4. | **Completeness of Stack Diagram** (e.g. *stack diagram is illustrated step-by-step and it is complete with no mistakes)* | / 10 |
| 5. | **Clarity and accuracy of Zero & One-Addresses** (e.g. *both zero- and one- addresses are designed clearly and accurately with no mistakes)* | / 10 |
| 6. | **Clarity and accuracy of Two & Three-Addresses** (e.g. *both two- and three- addresses are designed clearly and accurately with no mistakes)* | / 10 |
| 7. | **Task Distribution & References** (e.g. *Task distribution is shown clearly and additional references are provided in addition to video URL*) | / 10 |
| **Total Marks** | | **/ 100** |

## PART 1. QUESTION AND SOLUTIONS

### Program Execution Expression

X = [(A+D)-H\*E]- [U/A + (C-D\*B)]

### Postfix Notation

X = [(A+D)-H\*E]- [U/A + (C-D\*B)]

X = [(AD+)-H\*E]- [U/A + (C-D\*B)]

X = [(AD+)-H\*E]- [U/A + (C-DB\*)]

X = [(AD+)-H\*E]- [U/A + (CDB\*-)]

X = [(AD+)-HE\*]- [U/A + (CDB\*-)]

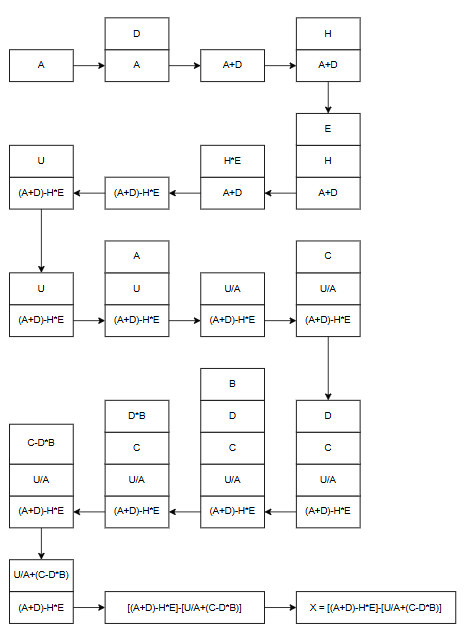
X = [(AD+)-HE\*]- [UA/ + (CDB\*-)]

X = [AD+HE\*-]- [UA/ + (CDB\*-)]

X = [AD+HE\*-]- [UA/ CDB\*-+]

X = AD+HE\*- UA/ CDB\*-+-

### Stack Diagram



### Zero-Address Machine Instruction

|  |
| --- |
| PUSH A |
| PUSH D |
| ADD |
| PUSH H |
| PUSH E |
| MUL |
| SUB |
| PUSH U |
| PUSH A |
| DIV |
| PUSH C |
| PUSH D |
| PUSH B |
| MUL |
| SUB |
| ADD |
| SUB |
| POP X |

### One-Address Machine Instruction

Show the solution of one-address machine instructions based on your self-designed program execution expression.

|  |  |  |
| --- | --- | --- |
| LOAD D | |  | | --- | | D |   AC |
| MUL B | |  | | --- | | D\*B |   AC |
| STORE R1 | |  | | --- | | D\*B |   R1 |
| LOAD C | |  | | --- | | C |   AC |
| SUB R1 | |  | | --- | | C-D\*B |   AC |
| STORE R1 | |  | | --- | | C-D\*B |   R1 |
| LOAD U | |  | | --- | | U |   AC |
| DIV A | |  | | --- | | U/A |   AC |
| SUB R1 | |  | | --- | | U/A- (C-D\*B) |   AC |
| STORE R1 | |  | | --- | | U/A- (C-D\*B) |   R1 |
| LOAD A | |  | | --- | | A |   AC |
| ADD D | |  | | --- | | A+D |   AC |
| STORE X | |  | | --- | | A+D |   X |

\

|  |  |  |
| --- | --- | --- |
| LOAD H | |  | | --- | | H |   AC |
| MUL E | |  | | --- | | H\*E |   AC |
| STORE R2 | |  | | --- | | H\*E |   R2 |
| LOAD X | |  | | --- | | A+D |   AC |
| SUB R2 | |  | | --- | | (A+D) - H\*E |   AC |
| SUB R1 | |  | | --- | | [(A + D) - H \* E] - [U / A - (C – D \* B)] |   AC |
| STORE X | |  | | --- | | [(A + D) - H \* E] - [U / A - (C – D \* B)] |   X |

### Two-Address Machine Instruction

Show the solution of two-address machine instructions based on your self-designed program execution expression.

|  |  |  |
| --- | --- | --- |
| MOVE X, A | |  | | --- | | A |   X |
| ADD X, D | |  | | --- | | A + D |   X |
| MOVE R1, D | |  | | --- | | D |   R1 |
| MUL R1, B | |  | | --- | | D \* B |   R1 |
| MOVE R2, C | |  | | --- | | C |   R2 |
| SUB R2, R1 | |  | | --- | | C – D \* B |   R2 |
| MOVE R3, H | |  | | --- | | H |   R3 |
| MUL R3, E | |  | | --- | | H \* E |   R3 |
| SUB X, R3 | |  | | --- | | (A + D) - H \* E |   X |
| MOVE R4, U | |  | | --- | | U |   R4 |
| DIV R4, A | |  | | --- | | U / A |   R4 |
| SUB R4, R2 | |  | | --- | | U / A - (C – D \* B) |   R4 |
| SUB X, R4 | |  | | --- | | [(A + D) - H \* E] - [U / A - (C – D \* B)] |   X |

### Three-Address Machine Instruction

Show the solution of three-address machine instructions based on your self-designed program execution expression.

|  |  |  |
| --- | --- | --- |
| MUL R1, D, B | |  | | --- | | D\*B |   R1 |
| SUB R2, C, R1 | |  | | --- | | C-D\*B |   R2 |
| DIV R1, V, A | |  | | --- | | U/A |   R1 |
| ADD R1, R1, R2 | |  | | --- | | U/A+(C-D\*B) |   R1 |
| ADD X, A, D | |  | | --- | | A+D |   X |
| MUL R3, H, E | |  | | --- | | H\*E |   R3 |
| SUB X, X, R3 | |  | | --- | | [(A + D) - H \* E] |   X |
| SUB X, X, R1 | |  | | --- | | [(A + D) - H \* E] - [U / A - (C – D \* B)] |   X |

## PART 2. DIVISION OF WORK

**Table 1.1:** Division of Work

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Kong Wen Khang** | **Kum Bing Sheng** | **Liaw Yong Loon** |
| Design Program Execution  Expression |  | **X** |  |
| Convert to Postfix Notation |  |  | **X** |
| Draw Stack Diagram |  |  | **X** |
| Design Zero-Address Machine  Instruction | **X** |  |  |
| Design One-Address Machine  Instruction |  | **X** |  |
| Design Two-Address Machine  Instruction |  |  | **X** |
| Design Three-Address Machine  Instruction |  | **X** |  |
| Documentation | **X** | **X** | **X** |
| Video Recording | **X** | **X** | **X** |
| Video Editing | **X** |  |  |

## REFERENCES