Assignment

Name of Student: Yashika Rawat **SAP ID:** 1000012341

Assignment ID: **CS212A2**	Assignment Title: - **Unit 2 Assignment**	Submission Mode: - **Online**	Assessment Method: - **Online**	Group/ Individual: -**Individual**	Weightage: **5 Marks**	Date of Release: **7/11/20**	Submission Deadline: **12/11/2020**

Instructions (Sample provided below, please change as necessary):

- Assignment must be submitted by the **Due Date and Time** as mentioned above.
- Assignment submitted after **Due Date and Time** and before the next 48 hours will be marked late and will attract a penalty of X marks (out of the overall Y marks, and it will be evaluated out of Y-X marks only). Assignment will not be considered for evaluation subsequently (after 48 hours past due date and time), and a score of zero will be awarded.
- Plagiarism is not allowed by the University for any Academic Document to be submitted by the students for any assessment. In order to avoid plagiarism ensure you always follow good academic practice. This include self- plagiarism i.e. submitting a peace of your own work which has provisionally been presented for examination.
- Submitted assignment must have your Full Name and SAP ID in the space provided above this page in the Header.

Submitting this Assignment

- You will submit (upload) this assignment in MS Teams.
- Email/paper submissions will not be accepted (except for UG students who are not yet registered in MS Teams).
- Questions must be answered in the given order.
- Submit a pdf version of this document.
- Name this document as A1_CSD207_Even2020_John_Doe.pdf in case your name is John Doe, and you are submitting Assignment 1 of the course whose code is CSD207, and it is offered in the Even Semester of the Year 2020.

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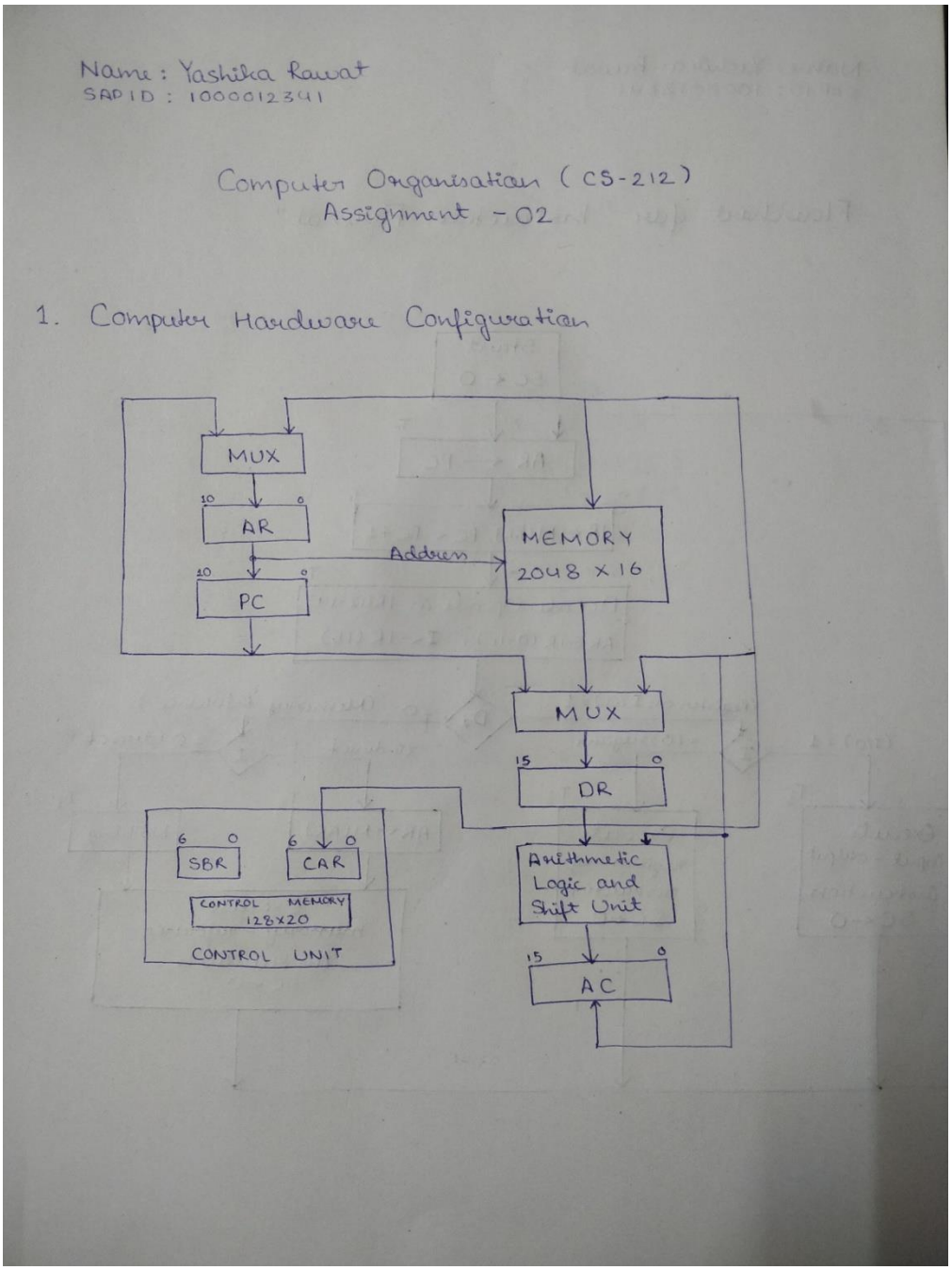
Problems:

Q1. Describe microprogrammed control unit with its computer hardware configuration flowchart and microinstruction format.

Solution:



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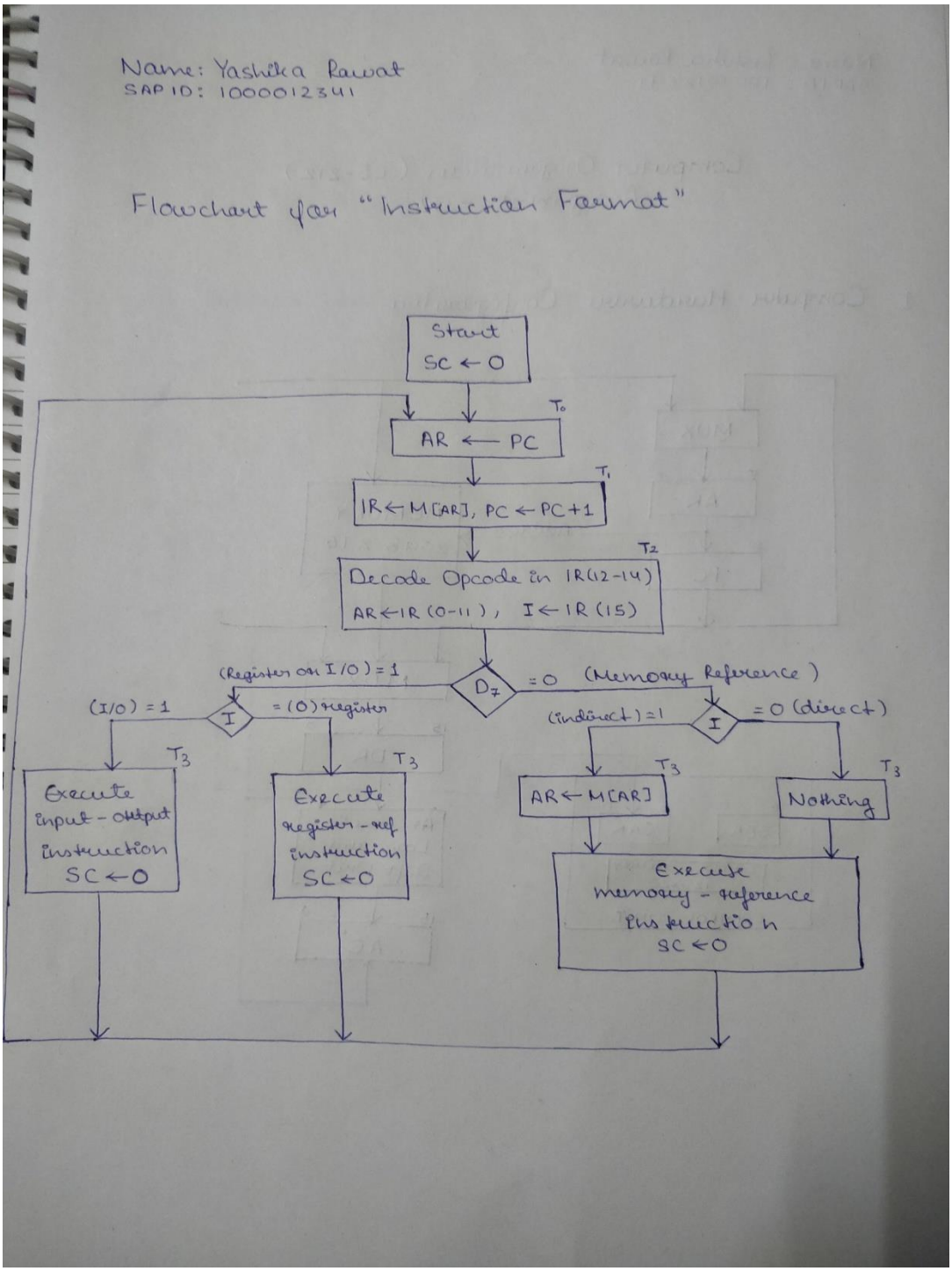

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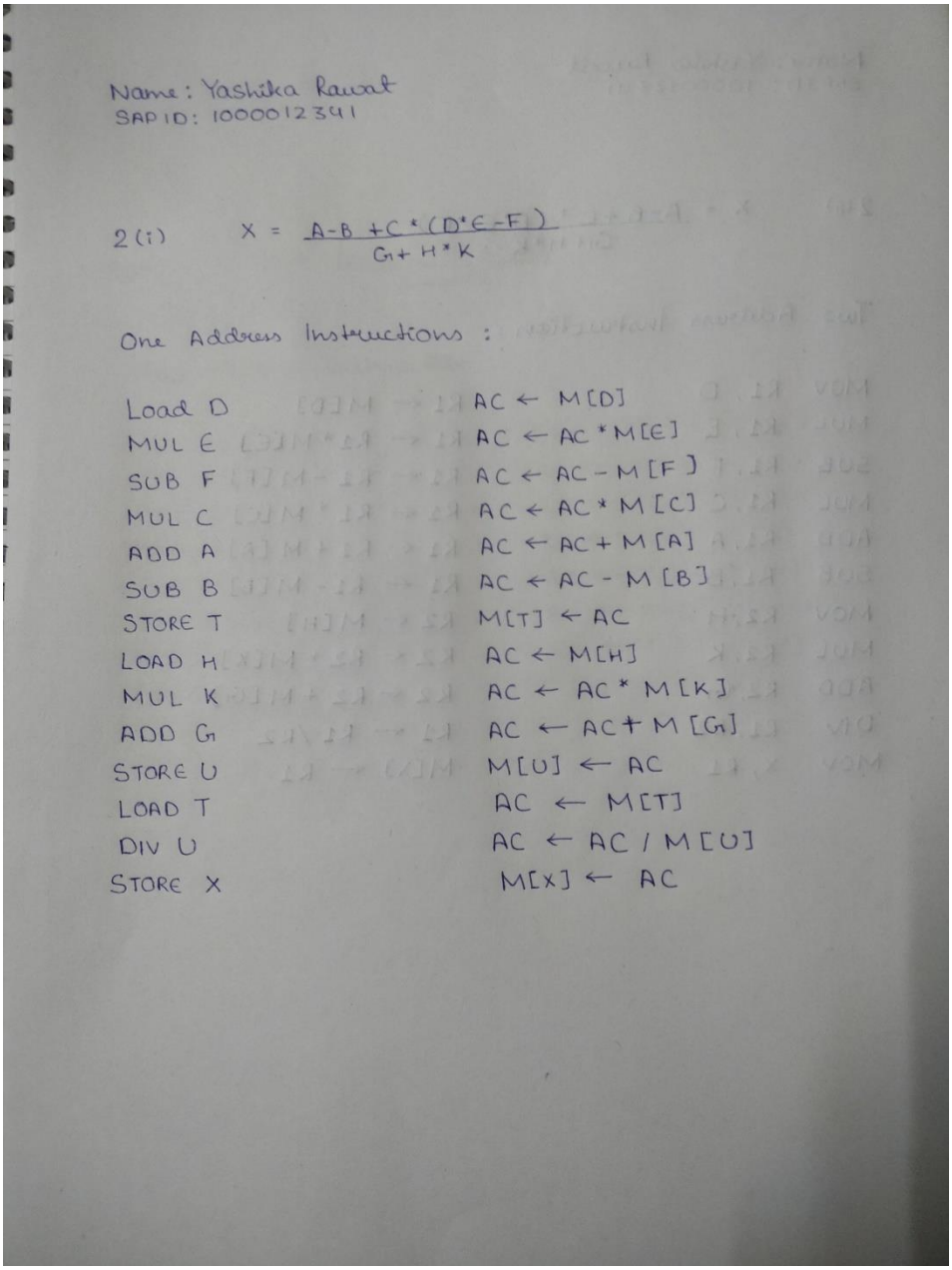
Q2. Write a program to evaluate the following expression in

$$X = \frac{A - B + C * (D * E - F)}{G + H * K}$$

(i) One Address Instruction



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2(i) $X = \frac{A-B+C*(D*E-F)}{G+H*K}$

One Address Instructions :

Load D	AC ← M[D]
MUL E	AC ← AC * M[E]
SUB F	AC ← AC - M[F]
MUL C	AC ← AC * M[C]
ADD A	AC ← AC + M[A]
SUB B	AC ← AC - M[B]
STORE T	M[T] ← AC
LOAD H	AC ← M[H]
MUL K	AC ← AC * M[K]
ADD G	AC ← AC + M[G]
STORE U	M[U] ← AC
LOAD T	AC ← M[T]
DIV U	AC ← AC / M[U]
STORE X	M[X] ← AC

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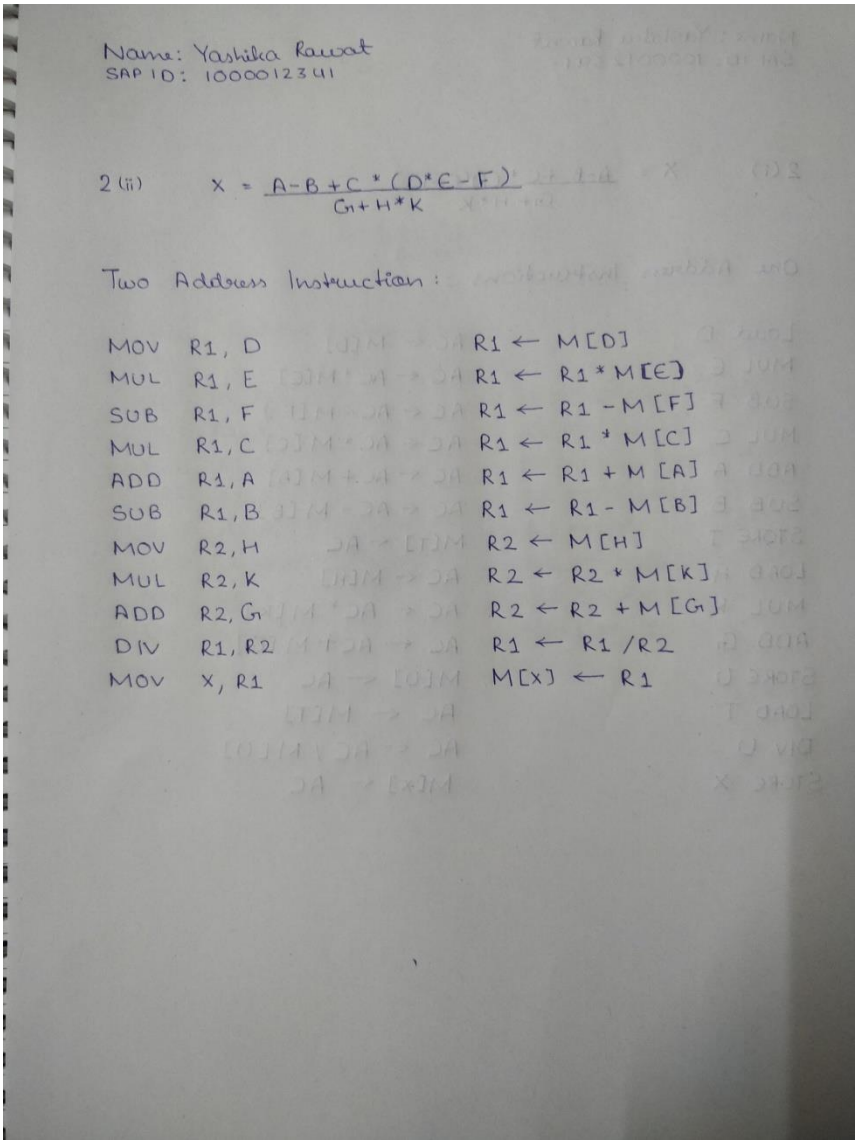
(ii) Two Address Instruction



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2 (ii) $X = \frac{A-B+C*(D*E-F)}{G+H*K}$

Two Address Instruction:

MOV	R1, D	R1 ← M[D]
MUL	R1, E	R1 ← R1 * M[E]
SUB	R1, F	R1 ← R1 - M[F]
MUL	R1, C	R1 ← R1 * M[C]
ADD	R1, A	R1 ← R1 + M[A]
SUB	R1, B	R1 ← R1 - M[B]
MOV	R2, H	R2 ← M[H]
MUL	R2, K	R2 ← R2 * M[K]
ADD	R2, G	R2 ← R2 + M[G]
DIV	R1, R2	R1 ← R1 / R2
MOV	X, R1	M[X] ← R1

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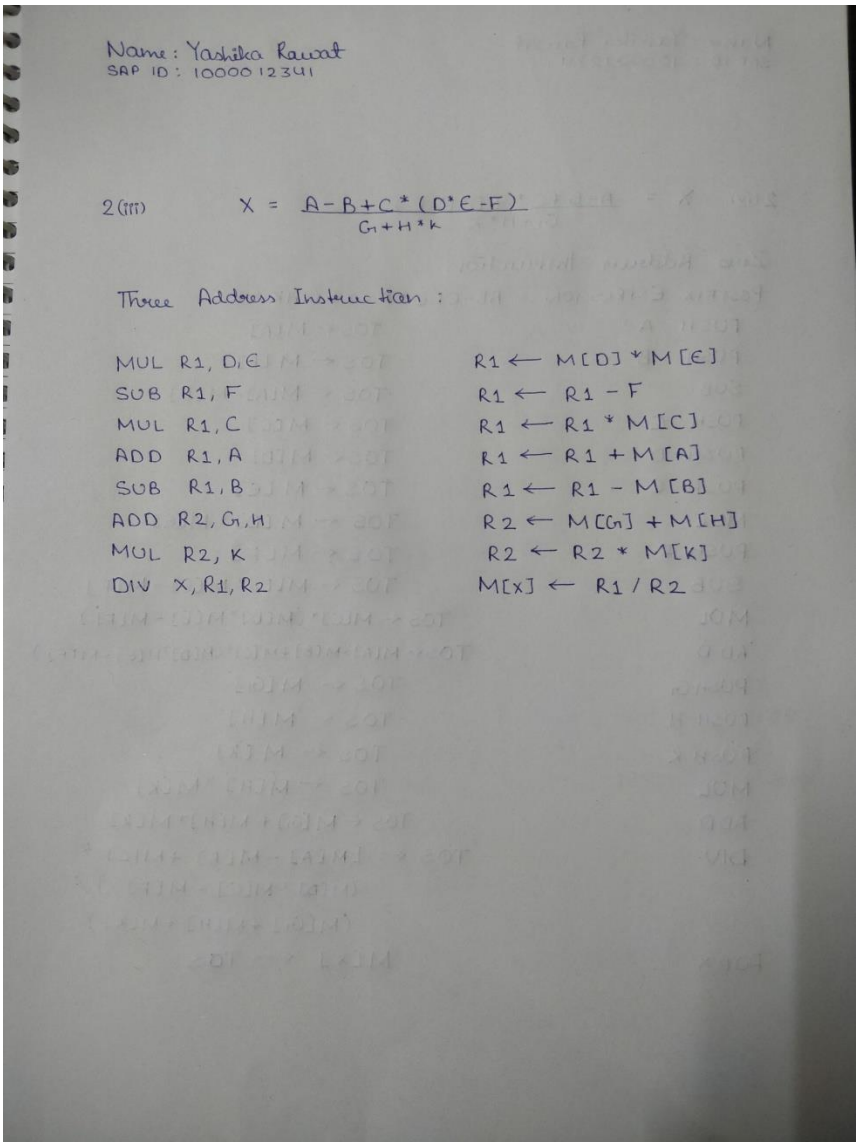
(iii) Three Address Instruction



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2(iii) $X = \frac{A-B+C*(D*E-F)}{G+H*K}$

Three Address Instruction :

MUL R1, D, E	R1 ← M[D] * M[E]
SUB R1, F	R1 ← R1 - F
MUL R1, C	R1 ← R1 * M[C]
ADD R1, A	R1 ← R1 + M[A]
SUB R1, B	R1 ← R1 - M[B]
ADD R2, G, H	R2 ← M[G] + M[H]
MUL R2, K	R2 ← R2 * M[K]
DIV X, R1, R2	M[X] ← R1 / R2

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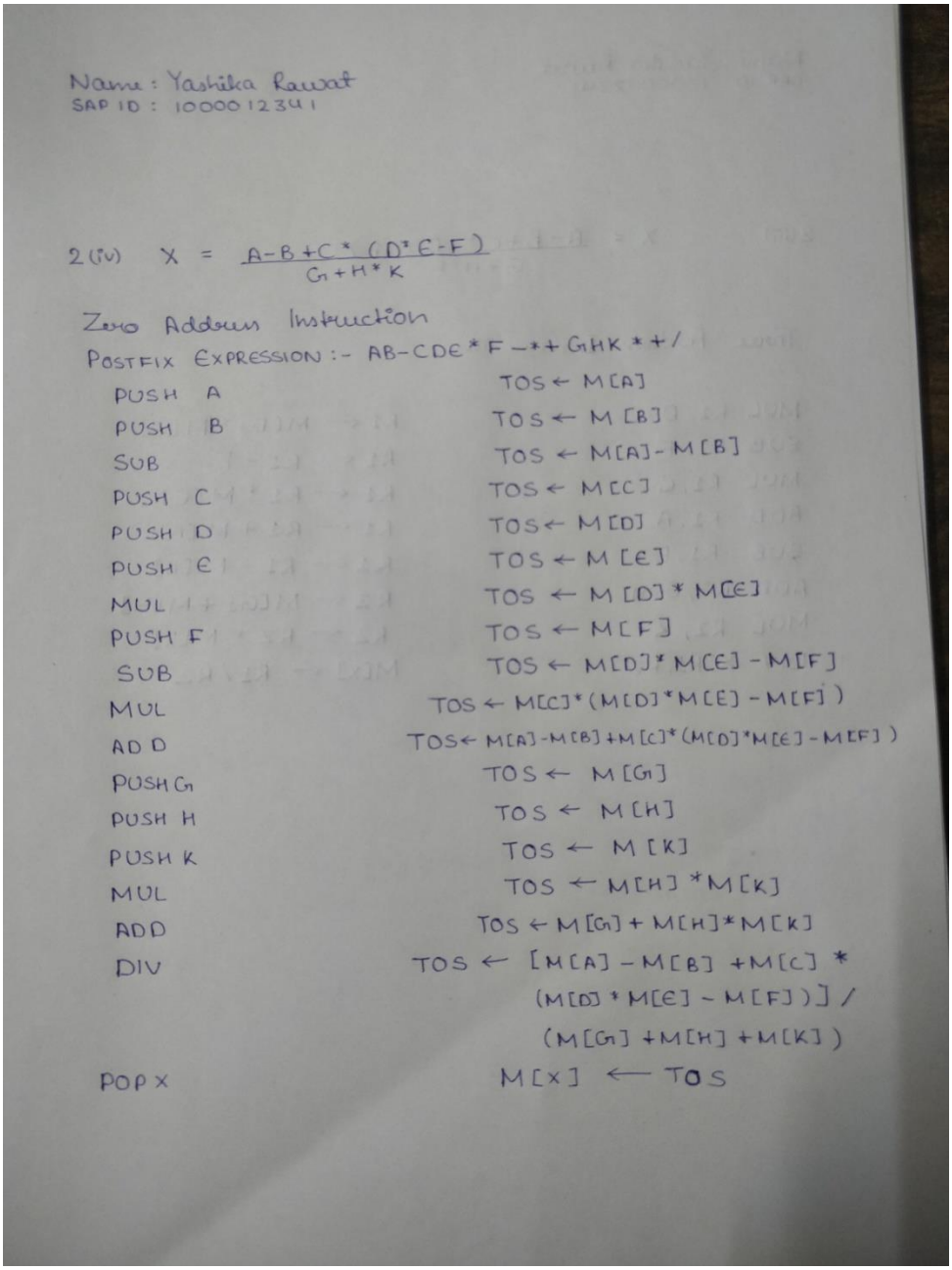
(iv) Zero Address Instruction



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2 (iv) $X = \frac{A-B+C*(D*E-F)}{G+H*K}$

Zero Address Instruction

POSTFIX EXPRESSION :- AB-CDE*F-*+GHK*+/

PUSH A	TOS ← M[A]
PUSH B	TOS ← M[B]
SUB	TOS ← M[A] - M[B]
PUSH C	TOS ← M[C]
PUSH D	TOS ← M[D]
PUSH E	TOS ← M[E]
MUL	TOS ← M[D] * M[E]
PUSH F	TOS ← M[F]
SUB	TOS ← M[D] * M[E] - M[F]
MUL	TOS ← M[C] * (M[D] * M[E] - M[F])
ADD	TOS ← M[A] - M[B] + M[C] * (M[D] * M[E] - M[F])
PUSH G	TOS ← M[G]
PUSH H	TOS ← M[H]
PUSH K	TOS ← M[K]
MUL	TOS ← M[H] * M[K]
ADD	TOS ← M[G] + M[H] * M[K]
DIV	TOS ← [M[A] - M[B] + M[C] * (M[D] * M[E] - M[F])] / (M[G] + M[H] + M[K])
POP X	M[X] ← TOS

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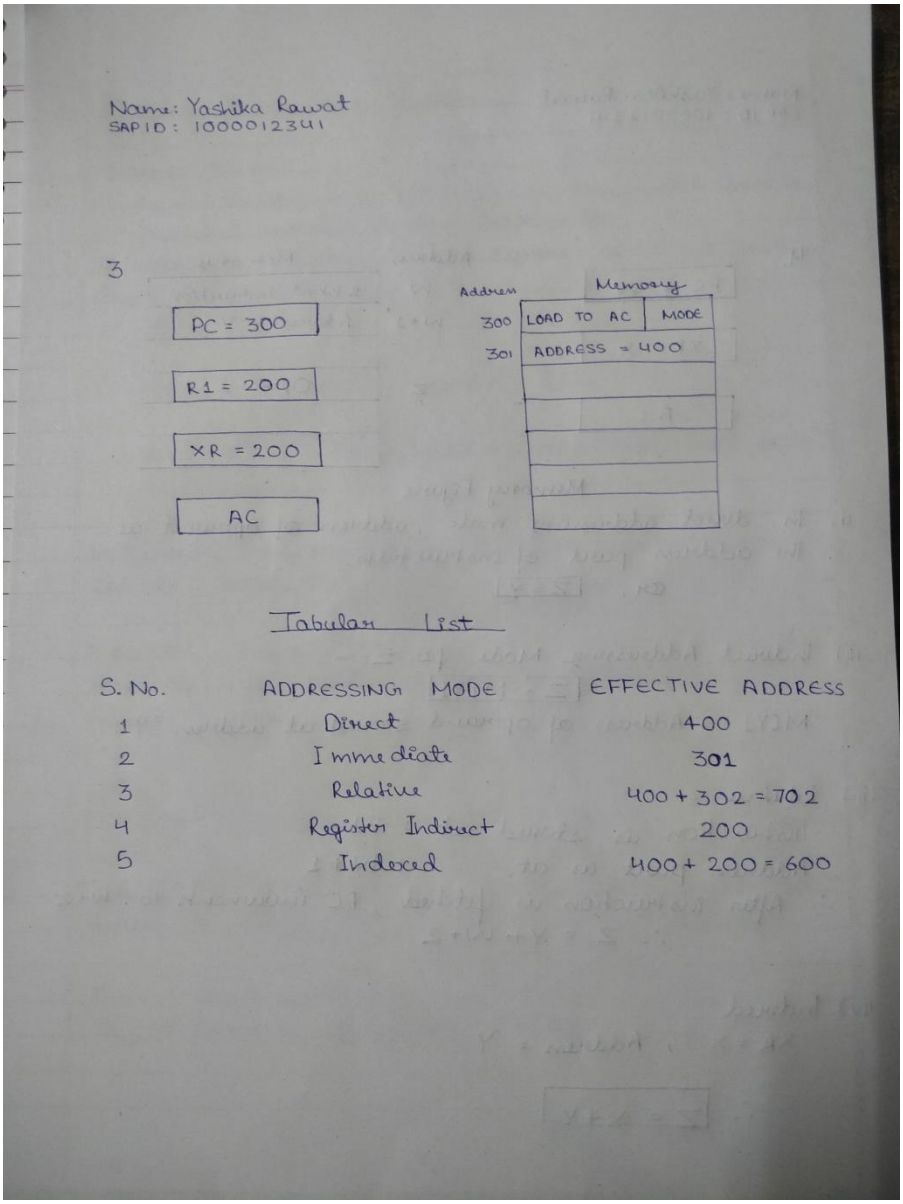
Q3. An instruction is stored at memory location 300 with its address field stored at memory location 301. Address field has the value 400. A processor register R1 has the value 200. Calculate the effective address if the addressing mode of the instruction is (i) Direct (ii) Immediate (iii) Relative (iv) Register Indirect (v) Index with R1 as index register.

Solution:



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Q4. A two word instruction is stored at memory location designated by symbol W. The address field of the instruction (stored at W+1) is designated by symbol Y. The operand used during the execution of the instruction is stored at an address symbolized by Z. The index register contains the value X. State how Z is calculated by other addresses if the addressing mode of the instruction is:

(i) Direct (ii) Indirect (iii) Relative (iv) indexed

Solution: