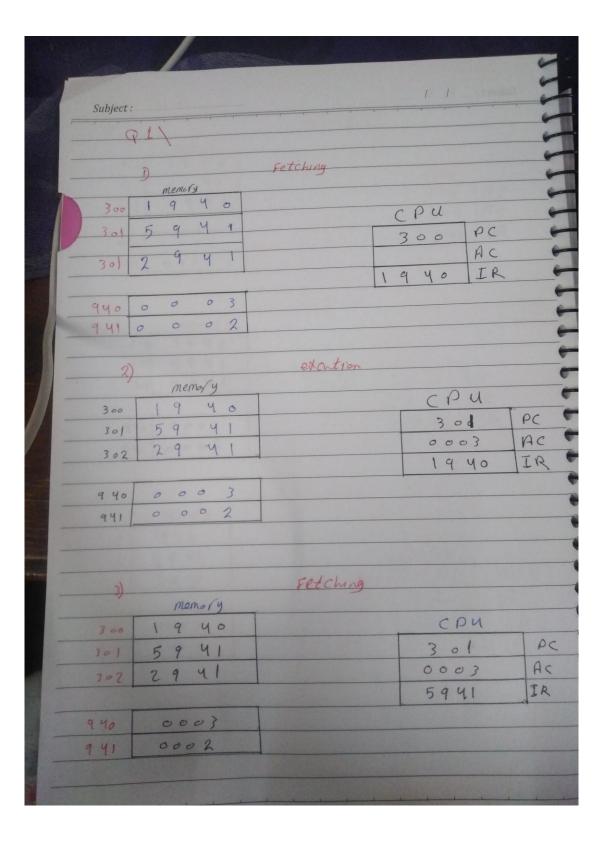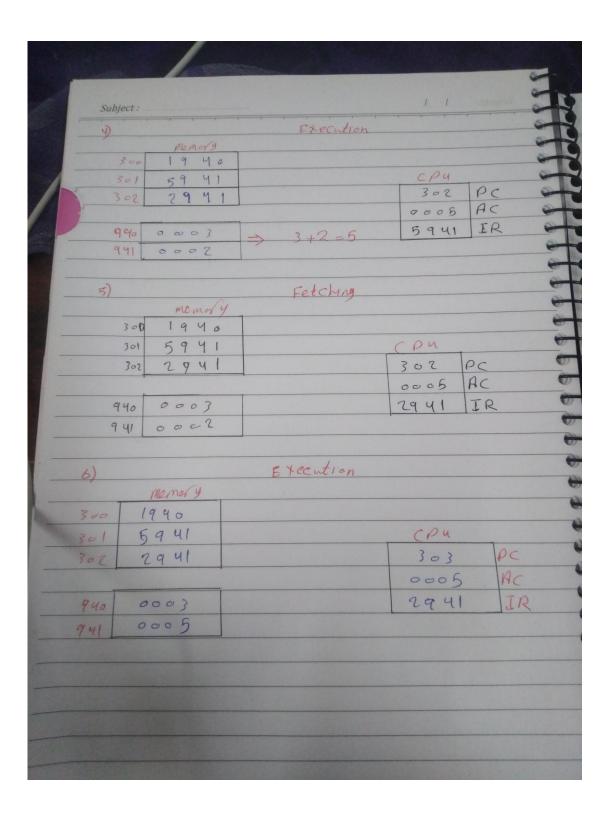In the Hypothetical Machine the contents of memory was as shown. And PC contents is 300. Show the contents of memory and PC , AC , IR after execute three instructions (three fetch cycle and there execute cycle)

Memory

300	1 9 4 0
301	5 9 4 1
302	2 9 4 1
⋮	
940	0 0 0 3
941	0 0 0 2

Q1\

1)   Fetching

memory

300	1	9	4	0
301	5	9	4	1
301	2	9	4	1

940	0	0	0	3
941	0	0	0	2

CPU

300	PC
	AC
1940	IR

2)   exicution

memory

300	1 9	4	0
301	5 9	4	1
302	2 9	4	1

940	0	0 0	3
941	0	0 0	2

CPU

300	PC
0003	AC
1940	IR

3)   Fetching

memory

300	1	9	40
301	5	9	41
302	2	9	41

940	0003
941	0002

CPU

301	PC
0003	AC
5941	IR

4)   Execution

memory

300	1 9 4 0
301	5 9 4 1
302	2 9 4 1

CPU

302	PC
0 0 0 5	AC
5 9 4 1	IR

| 940 | 0 0 0 3 | ⇒   3 + 2 = 5
| 941 | 0 0 0 2 |

---

5)   Fetching

memory

300	1 9 4 0
301	5 9 4 1
302	2 9 4 1

CPU

302	PC
0 0 0 5	AC
2 9 4 1	IR

| 940 | 0 0 0 3 |
| 941 | 0 0 0 2 |

---

6)   Execution

memory

300	1 9 4 0
301	5 9 4 1
302	2 9 4 1

CPU

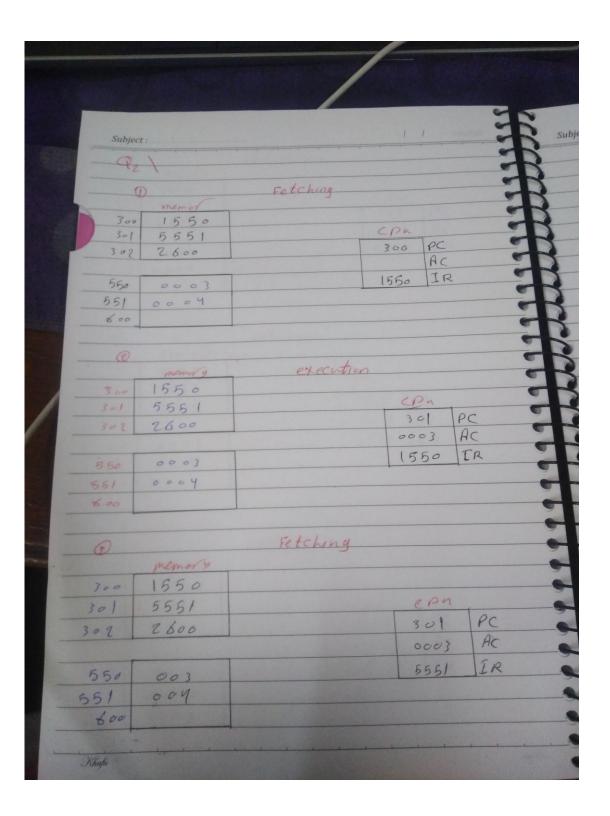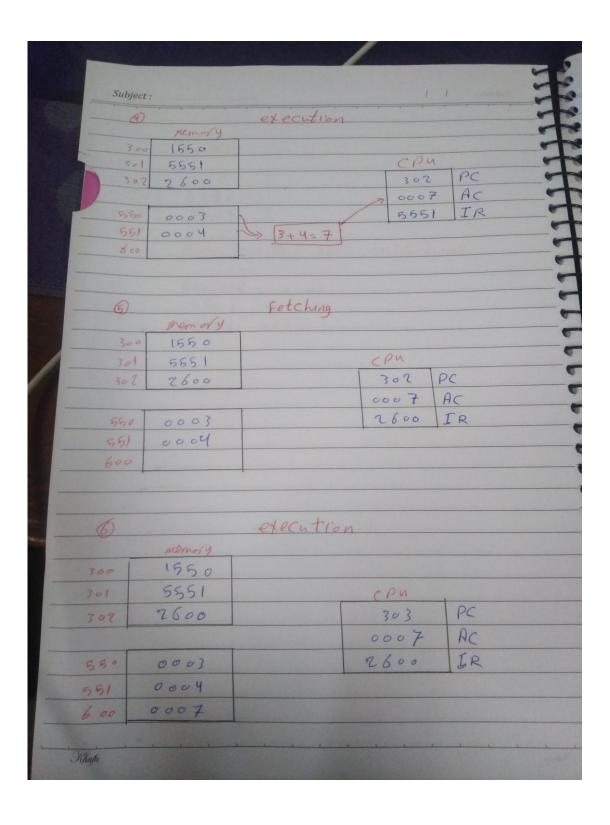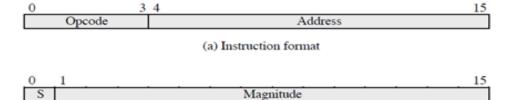| 303 | PC |
| 0 0 0 5 | AC |
| 2 9 4 1 | IR |

| 940 | 0 0 0 3 |
| 941 | 0 0 0 5 |

Show the contents of PC , AC and IR and memory after the execution of each instruction of the following program on the Hypothetical Machine:

300 LOAD 550
301 ADD 551
302 STORE 600

Where the contents of memory at 550 is 3 and at 551 is 4

The following figure provide the main characteristics of Hypothetical Machine.

Q₂ \

①   Fetching

memory

300	1550
301	5551
302	2600

CPn

300	PC
	AC
1550	IR

550	0003
551	0004
600	

②   execution

memory

300	1550
301	5551
302	2600

CPn

301	PC
0003	AC
1550	IR

550	0003
551	0004
600	

③   Fetching

memory

300	1550
301	5551
302	2600

CPn

301	PC
0003	AC
5551	IR

550	003
551	004
600	

④   execution

memory

300	1550
301	5551
302	2600

CPU

302	PC
0007	AC
5551	IR

550	0003
551	0004
600	

$3 + 4 = 7$

---

⑤   Fetching

memory

300	1550
301	5551
302	2600

CPU

302	PC
0007	AC
2600	IR

550	0003
551	0004
600	

---

⑥   execution

memory

300	1550
301	5551
302	2600

CPU

303	PC
0007	AC
2600	IR

550	0003
551	0004
600	0007

Khufu

```
0                3 4                                          15
┌─────────────────┬──────────────────────────────────────────┐
│     Opcode      │                 Address                  │
└─────────────────┴──────────────────────────────────────────┘
```

(a) Instruction format

```
0    1                                                       15
┌────┬────────────────────────────────────────────────────────┐
│ S  │                    Magnitude                            │
└────┴────────────────────────────────────────────────────────┘
```

(b) Integer format

Program Counter (PC) = Address of instruction
Instruction Register (IR) = Instruction being executed
Accumulator (AC) = Temporary storage

(c) Internal CPU registers

0001 = Load AC from Memory
0010 = Store AC to Memory
0101 = Add to AC from Memory

(d) Partial list of opcodes

The hypothetical machine also has two I/O instructions:

0011 = load AC from I/O

0111 =store AC to I/O

In these case, the 12-bi address identifies a particular I/O
device. Show the program execution for the following
program:

1. Load AC from device 5.

2. Add contents of memory location 940.

3. Store AC to device 6.

Q3:

memory

300	3005
301	5940
302	7006.

After executing three instructions

Device5 : 0003

940 :   2

Device 6: 0005