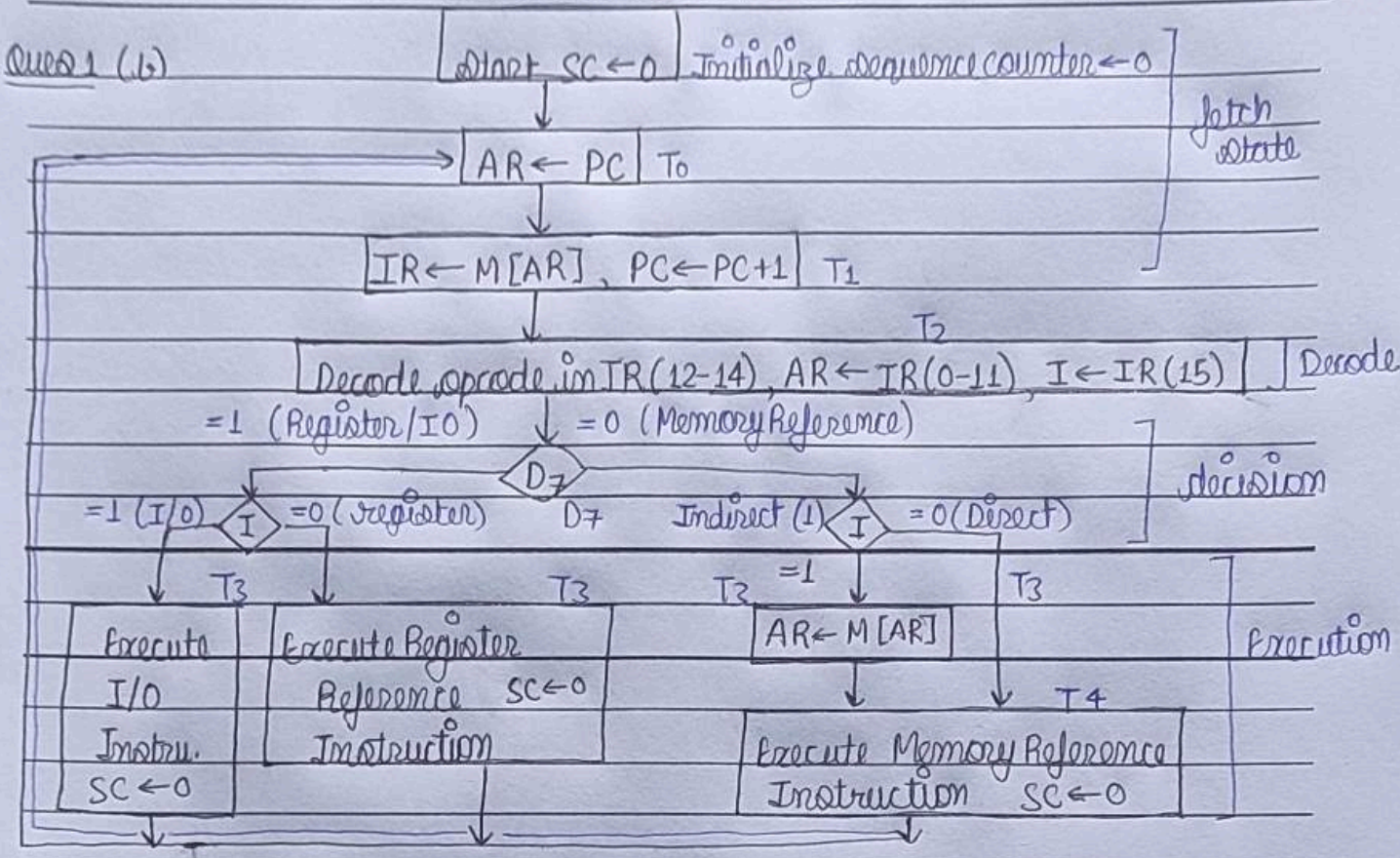
Deepankar Sharma

Graphic Era Hill University, Dehradun
(Answer Sheet for Online Examination Jan. 2022)

Please tick (√) your campus: (DEHRADUN/BHIMTAL/HALDWANI)

Name: Deepankar Sharma Univ.Roll No. ...2092014..... Student ID.....2004129.....
Date: 14 Jan 2022 Course: ...BCA..... Branch: ..... Sem.: 03.... Section: .....
Subject Name: ....COA..... Subject Code: TBC-303 Page No. 01.....

Ques 1 (b)

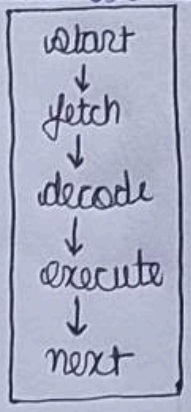


Flowchart for Instruction Cycle

It consists of essentially 7 steps.

① Start SC←0 ② To ; AR←PC. ③ Decode the instruction & incre. PC
④ Decode opcode ⑤ Decision ⑥ Execution

The instruction cycle is the cycle that the CPU follows from boot-up until the computer has shut down in order to process instructions



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Name: Deepankar Sharma Univ.Roll No. 20920114 Student ID 20041299
Date: 14 Jan Course: BCA Branch: Sem.: 03 Section:
Subject Name: COA Subject Code: TBC-303 Page No.

Ques2 (a) difference between Machine language and Assembly Language:
Machine language: It is low level programming language which is represented in 0s and 1s. It is the binary language which is only understandable to machine in form of high and low voltages.
Assembly Language: Assembly language is somewhere in between of low level machine language and high level human languages. Assembly language uses mnemonics, letters, numbers and symbols but not full statements to express instructions

#assembly language program to add two numbers

Memory Address	Mnemonics	Comment
2000	LDA 2050	AC ← [2050]
2003	MOV H, AC	H ← AC
2004	LDA 2051	AC ← [2051]
2007	ADD H	AC ← AC + H
2008	MOV L, AC	L ← AC
2009	MVI AC 00	AC ← 00
200B	ADC AC	AC ← AC + AC + carry
200C	MOV H, AC	H ← AC
200D	SHLD 3050	H → 3051, L → 3050
2010	HLT	

I've used HL pair registers in order to not let go of carry bit and use carry in the result.
And the memory locations are not supposed to be exact.

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Normal Programme to add two numbers would be :

LDA A	AC ← A
ADD B	AC ← AC + B
STA A	A ← AC. [Sum]

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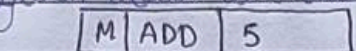
Date: 14 Jan. Course: BCA Branch: Sem.: 03 Section:
Subject Name: COA Subject Code: TBC-303 Page No.

Ques 3 (a) **Addressing Modes** - These are different ways in which locations of an operand is specified in an instruction.

different types of addressing modes are:

① Implicit / Implied Addressing Mode → no memory reference, and data value is provided, like CMA, INCA

② Immediate Addressing Mode → data value is given with the instruction instead of some address, eg ADD 5



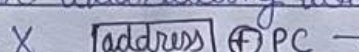
③ Direct Addressing Mode → mode bit, (M=0), Effective Address is given as the operand, eg ADD A , AC ← AC + [A]

④ Indirect Addressing Mode → mode bit (M=1), address where Effective address is stored is given as operand, eg. ADD X , AC ← AC + [[X]]

⑤ Register Addressing Mode → register is given as the operand, means Effective address = Register, fastest addressing mode. ADD R , AC ← AC + [R]

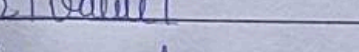
⑥ Register Indirect Addressing Mode → operand have address of register holding Effective address, uses memory reference.

⑦ Relative Addressing Mode → uses displacement addressing with respect to the program counter, eg. EA = PC + X



⑧ Indexed Addressing Mode → used while dealing with sequence data like arrays, showing index, EA (Effective Add.) = [X] + [R]
constant ↵ ↳ Register to ind

⑨ Base Addressing Mode →



EA = content of Base Register + value

⑩ Auto Increment / Decrement addressing modes →
a constant value stored in register is incremented or decremented from operand to get Effective Address

$$EA = \pm [R_i]$$

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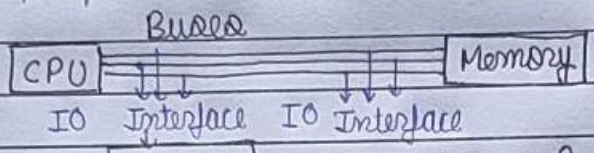
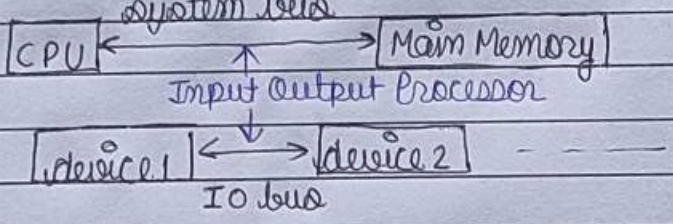
Ques 4 (b)

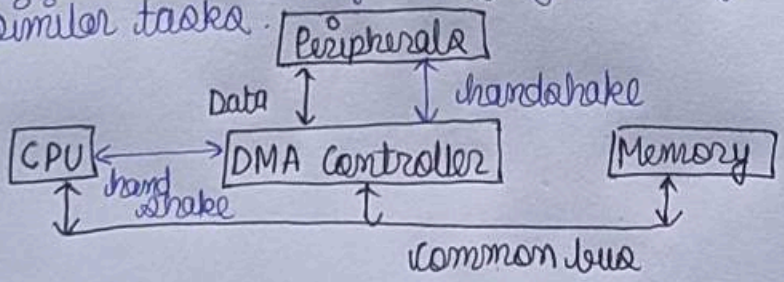
(i) Input Output Interface - Input output Interface is used as a connecting link which helps in transferring the information between the memory and the other peripheral devices.



(ii) Input Output Processor - Input Output Processor is a specialized processor which loads and stores data into memory along with the execution of I/O instructions. It acts as an interface between the system and the devices. It involves sequence of events to executing I/O operations and then store the results into the memory.



(iii) Direct Memory Access - Direct Memory Access (DMA) is a feature of computer systems that allows certain hardware subsystems to access main system memory (RAM) independently of CPU. DMA can be used for copying, moving data in memory and other similar tasks.



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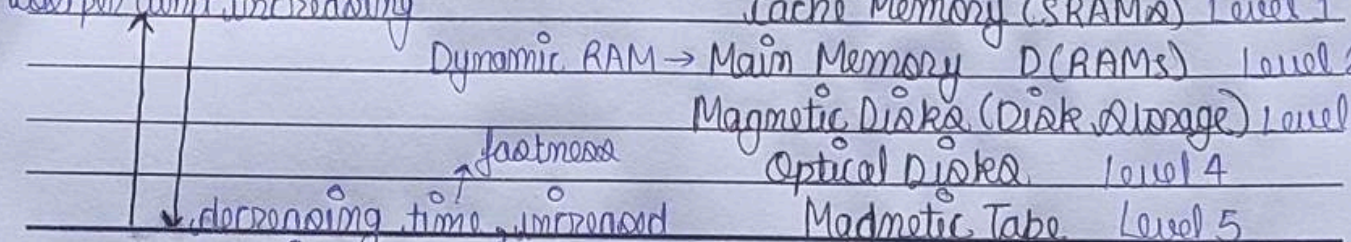
Subject Name: .....COA..... Subject Code: TBC-303 Page No. .....

Ques 5 (a) Memory Hierarchy is an enhancement in computer system Design and organization to organize the memory such that it can minimize the access time. The memory hierarchy is developed based on a program behaviour known as locality of references.



This memory hierarchy is divided into two main types:

① External Memory / Secondary Memory → comprises magnetic disks, peripherals storage devices and accessible by processor via I/O module.

② Internal Memory / Primary Memory → It comprises of main memory cache and CPU registers

Characteristics of Memory Hierarchy

(i) Capacity → global volume of memory, increases at higher levels (L0, L8)

(ii) Access Time → I/O time period, increases at higher levels where memory is usually slow

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(iii) Cost per bit → Cost occurred to store one bit, increases toward lower levels, hence CPU registers are very expensive