Day: M T W T F S

Date: ___/___/___

NAME JIBRAN

ID 14472

SUBJECT COMPUTER ARCHITECTURE

SEMESTER 4th

DATE 25/09/2020

Q(1) part (a)

(1) location.
(2) Capacity
(3) Access method
(4) Unit of tranfer
(5) Performance
(6) Physical types
(7) Organization
(8) Physical characteristics.

Q(1) part (b)

* Option 1: Write through:

You and L2 are soulmates. Inconsistancy will L2 is intolerable to you. You feel uncomfortable when you and L2 disagree about important issues like the data at address XXX. To deal with this discomfort, you immediately tell L2 about this new version of the data.

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* Option 2: Write back:

You have a more hands-off relationship with your discussions are on a need to know basis. You quietly keep track of the fact that you have modified this block. if you ever need to evict the block, that's when you'll finally tell it what's up.

Q (1) part (c)

(1) Problem: External memory slow than the system bus.
- Solution: Add external cache using faster memory technology.
- Processor on which feature first appear: 386.

Problem:-
(2) Internal cache is rather small, due to limited space on chip.
- Solution:- Add external L2 cache using faster technology than main memory.
- 486.

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Q(1) part (d)

* Head Motion
  Fixed head (one per track)
  Moveable head (one per surface)
* Platters
  single platter
  Multiple platter

* Disk portability:
  Non-removable.
  Removable disk
* Head mechanism:
  Disk contact (floppy)
  Fixed gap
  Aerodynamic gap (Winchester).

* Sides
  Single sided
  Double sided.

Q(1) pat (e)

Ans. Each scheme, or RAID level, provides a different balance among the key goals reliability, availability, performance and capacity. RAID levels greater than RAID 0 provide protection against unrecoverable sector read errors, as well as against failures of whole physical drives.

* Parallel access:-
  All member disk participate in the execution of

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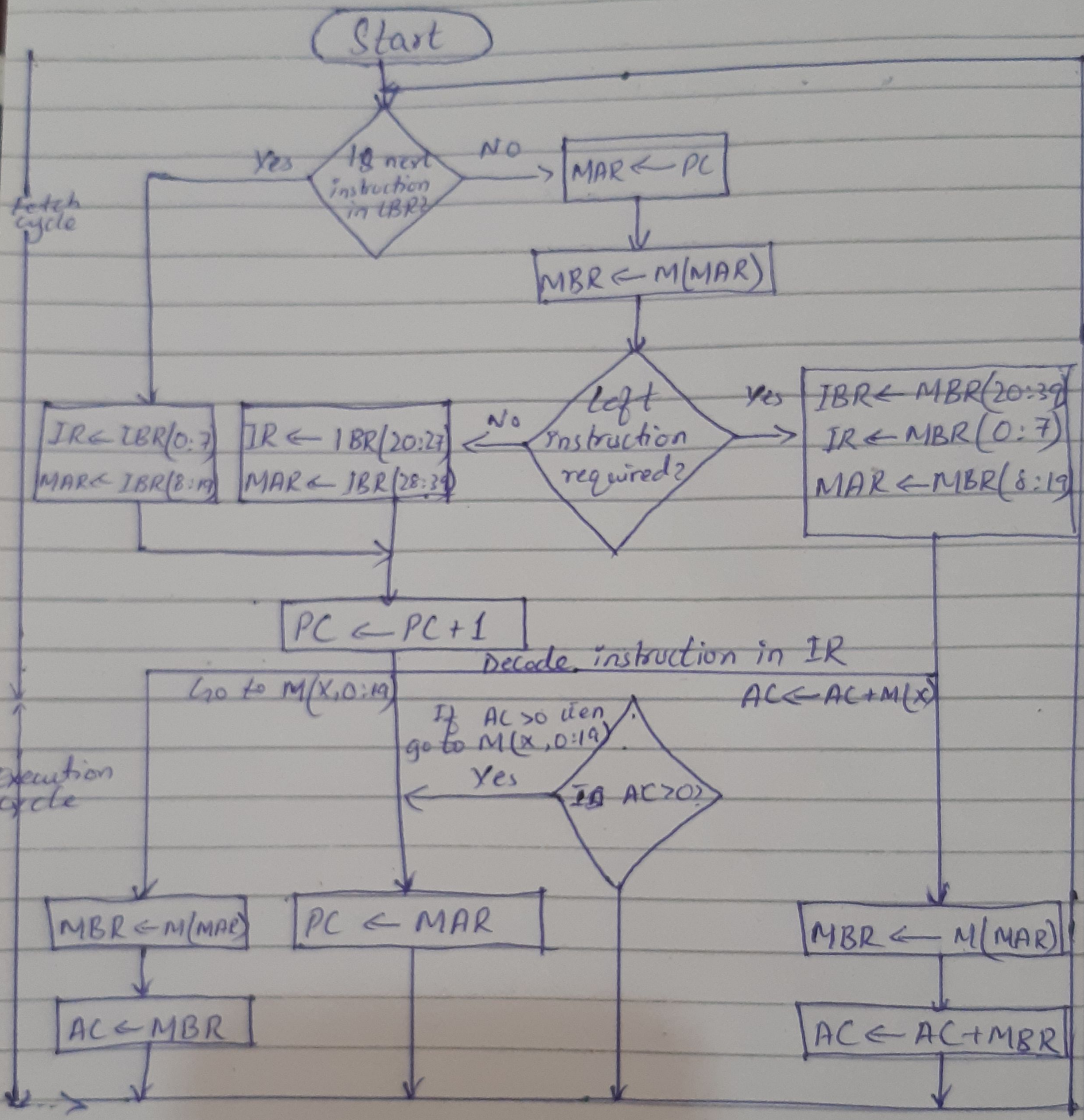
every I/O request - Typically the spindles of the individuals drives are synchronized so that each disk head in the same position on each disk at any given time.

* Independent access:

Each member disk operates independently. So that separate I/O requests can be satisfied in parallel.

Q(2) part (a)


Start
Fetch cycle
Is next instruction in IBR?
Yes
No
MAR ← PC
MBR ← M(MAR)
Left instruction required?
Yes
No
IBR ← MBR(20:39)
IR ← MBR(0:7)
MAR ← MBR(8:19)
IR ← IBR(0:7)
MAR ← IBR(8:19)
IR ← IBR(20:27)
MAR ← IBR(28:39)
PC ← PC+1
Decode instruction in IR
Execution cycle
Go to M(X,0:19)
If AC>0 then go to M(X,0:19)
Is AC>0?
Yes
AC ← AC+M(X)
MBR ← M(MAR)
AC ← AC+MBR
MBR ← M(MAR)
AC ← MBR
PC ← MAR

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Q (2) part (b)

A SRAM cell:-

A typical SRAM cell is made up of six MOSFETs. Each bit in an SRAM is stored on four transistors (M1, M2, M3, M4) that form two cross-coupled inverters. This storage cell has two stable states which are used to denote 0 and 1.

Q (2) part (c)

Typical Megabit DRAM (4M x4)..

Because only 4 bits are read/written to their DRAM there must be multiple DRAM connected to the memory controller to read/written a word of data to the bus. All the DRAMs requite a refresh operation. A simple technique for refreshing is in effect to disable the DRAM chip while all the data cells are refreshed the refresh counter steps through all of the row values his raises each cells in row to be refresh.

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Q(2) part (d)

* Write:-

The write mechanism exploits the facts that electricity flowing through a coil produce a magnetic field Electric pulses are sent to the write head & the resulting magnetic patterns are recoded on the surface below, with different pattern for positive and negative currents. The write head itself is madeup of easily magnetizable material and is in the shape of rectangular in daughnut with a gap along one side and a few turns of conducting wires along the opposite side. An electric current in the wire induce a magnetic field across the gap which in turn magnetize a small area of recording medium.

* Read:-

The traditional seal mechanism exploits facts that a magnetic field moving relative to a coil produces an electrical current in the coil. When the surface of

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the disk passes under the head, it generates a current of the same polarity as the one already recorded. The structure of the head for reading in this case essentially the same as for writing therefore the same head can be used for both such single head are used in floppy disks systems and in older rigid systems.

Q (3) part (a)

Unified v Split caches:

* One cache for data and instructions or two, one for data and one for instructions.
* Advantages of unified cache:-
  - Higher hit rate.
  - Balances load of instruction and data fetch.
  - Only one cache to design and implement.
* Advantages of split cache:
  - Eleminates cache contention between instruction fetch/decode unit and execution unit.
  - important in pipelining.

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Q(3) part (b)

* Hard Disk Drives.
- Rotating platters and mechanical arms = comparatively fragile construction.
- High energy consumption - reduced battery life.
- Increased file fragmentation = decreased performance.
- Greater risk of data loss and hard drive failure when transported.

* Solid - State Drives.
- No moving parts = more rugged construction.
- low energy consumption = prolonged battery life and cooler system.
- Fragmentation not an issue, result is consistent performance.
- Little or no risk of data loss; resistant to mobile users expected bumps and drops.

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Q(3) part (c)

* Constant Angular velocity (CAV)
- increasing space between bits.
- bits can be scanned at the same rate.
- devide disk into a number of pie-shaped. sectors and a series of concentric tracks.
- Pro: block can be directly address by track and sector.
- Con: long outer track can store data in the same amount as short inner tracks.

* Multiple Zone Recording:
- devide disk into a number of zones (~16).
- within a zone, the number of bits per track is constant.
- zones farther from the center contain more bits (more sectors) than the closer.
- the time to move a head for reads and writes vary from one zone to another.
- Pro: increasing capacity.

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Q(3) part (d)

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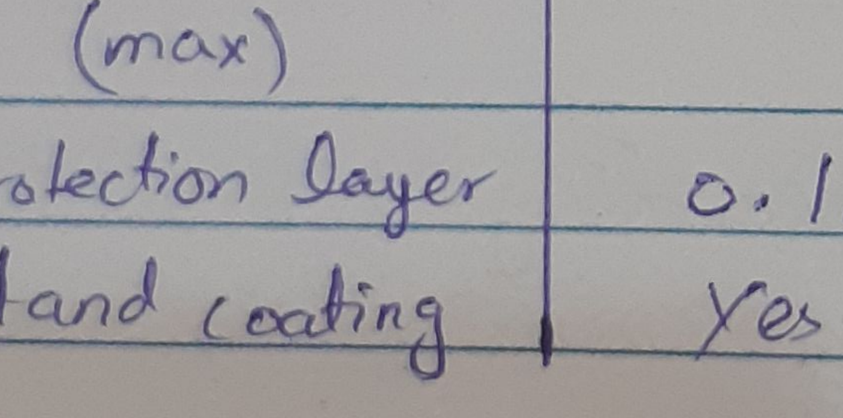
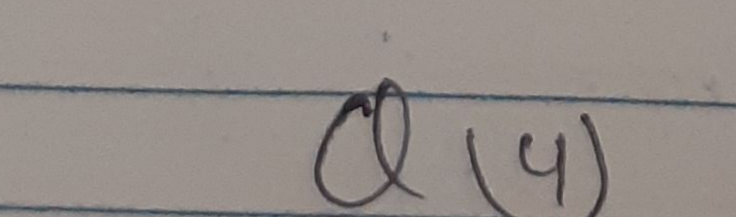
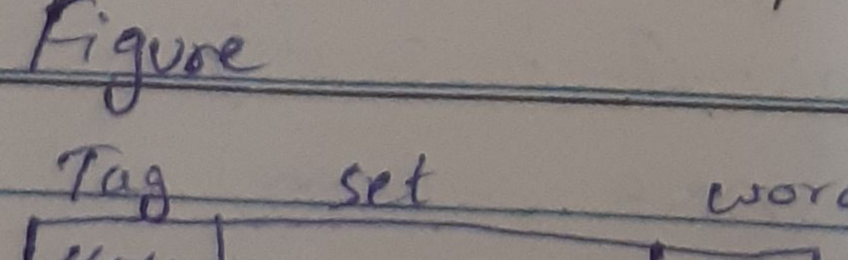
	Parameters	Blu-ray	DVD
-	Storage capacity	25 GD (single-layer)	4.7 GB (single-layer)
		50 GD (dual-layer)	8.5 GB (dual-layer)
-	laser wavelength	405 (blue laser)	650 nm (red laser)
-	Numerical aperture	0.85	0.60
-	Disc diameter	120 mm	120 mm
	Disc thickness	1.2 mm	1.2 mm
-	Data transfer rate (data)	36.0 Mbps (1x)	11.08 Mbps (1x)
-	Data transfer rate (video/audio)	54.0 Mbps (1.5x)	10.08 Mbps (1x)
-	Video resolution (max)	1920 x 1080 (1080p)	720 x 480 / 720 x 576
-	Video bit rate (max)	40.0 Mbps	(480i/576i) 9.8 Mbps
-	Protection layer	0.1 mm	0.6 mm
-	Hard coating	Yes	No

Q(4) part (a)

Figure

a		FEDC'BAH FE-2FED-3
b		2AGFED-3
c		177-EEE-3

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Q(4) part (b)

M = 8

$2^k - 1 >= k + m$

$2^4 - 1 >= 4 + 8$

$15 >= 12$

1	2	3	4	5	6	7	8	9	10	11	12
1	0	1	1	1	0	0	1	0	0	1	0

- The check bits are in bit numbers 1, 2, 4, and 8.
- Check bit 8 calculated by values in bit numbers: 9, 10, 11 and 12.
- Check bit 4 calculated by values in bit numbers: 5, 6, 7 and 12.
- Check bit 2 calculated by values in bit numbers: 3, 6, 7, 10 and 11
- check bit 1 calculated by values in bit number: 3, 5, 7, 9, 10 and 11

Thus, the check bits are: 1011.

Q(4) part (c)

Solution:

7200 revolution in 60 sec

1 revolution in 60/7200 OR

1 revolution in 6ms

1 revolution = Covering one entire track = 500 sector

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500 sector = 6ms

1 sector = 8 microsecond.

Now there are 2 different things.

(1) 2500 sectors 50 time = 2500 × 8ms = 20ms

(2) 1.28 MB = 1342177.28 Bytes OR
2621.44 sectors = 2622 sector =
20.976 ms

Total time Case:

Case (1) 4+2+20 = 26ms

Case (2) 4+2+20.976 = 26.976ms