



**PSG COLLEGE OF TECHNOLOGY, COIMBATORE -4.**

**F 22464**

| Roll No.          | Name of the Student | Signature of the Student              | Signature of the Invigilator |    |       |                             |                   |
|-------------------|---------------------|---------------------------------------|------------------------------|----|-------|-----------------------------|-------------------|
| 22Z210            | Andresalvam .JH     | AJ                                    | AB                           |    |       |                             |                   |
| Branch & Semester | BE CSE G1           | V Test No. 3                          | Date 22/10/24                |    |       |                             |                   |
| Course Code       | 19Z502              | Title Microprocessors and Interfacing |                              |    |       |                             |                   |
| Faculty Use       | Marks Scored        |                                       |                              |    |       | Grand Total (Out of .....,) | Faculty Signature |
|                   | Qn.                 | a                                     | b                            | c  | Total |                             |                   |
|                   | 1                   | 5                                     |                              |    | 5     |                             |                   |
| 2                 | 6+1                 | 5                                     | 5                            | 9L | 26L   | 31L                         | an                |

- i) a) ✓ 17 26L
- ii) c) ✓
- iii) MOV CX, 1234H ✓
- iv) B) ✓
- v) maximum +
- vi) B) ✓
- vii) PC<sub>6</sub> (1<sup>00</sup> XX<sub>0</sub> XX) ✓
- viii) B) ✗ mode mode
- ix) B) ✗
- x) a)
- i) D) ✓
- ii) Protected mode —
- iii) A) (if it uses 8X2 + 8 = 24) ✓
- iv) B) ✓
- v) C) ✓
- vi) 8-bitduino ✓
- vii) C) ✗ ✓ 32/64 - Raspberry Pi (uses 64)



#2

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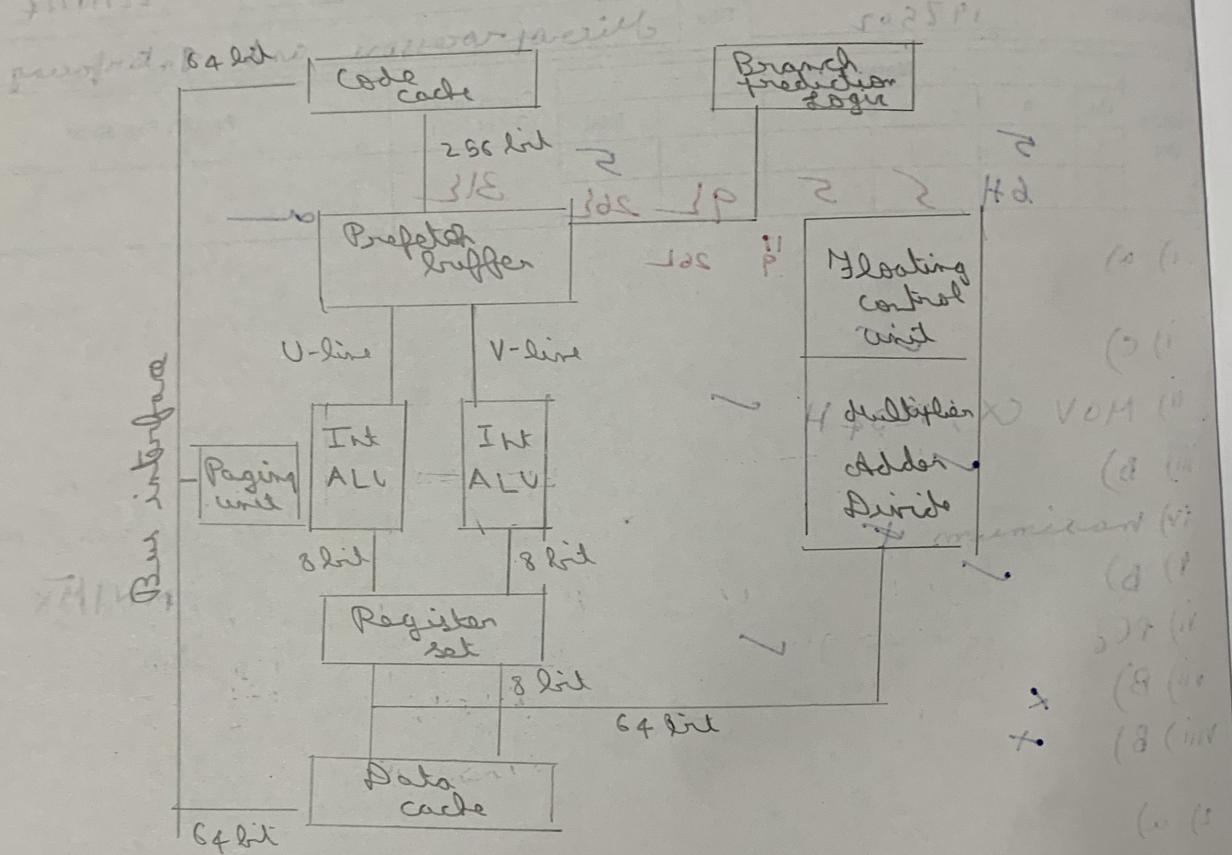
16 Pages

| Roll No.          | Name of the Student | Signature of the Student |                                 | Signature of the Invigilator |                                      |                   |       |
|-------------------|---------------------|--------------------------|---------------------------------|------------------------------|--------------------------------------|-------------------|-------|
| 22Z210            | Anbuselvam . M      | A. M.                    |                                 | A. S.                        |                                      |                   |       |
| Branch & Semester | BE CSE (G)          | V                        | Test No.                        | 3                            | Date                                 |                   |       |
| Course Code       | 19Z502              | Title                    | Microprocessors and Interfacing |                              |                                      |                   |       |
| Faculty Use       | Marks Scored        |                          |                                 |                              | Grand Total<br>(Out of .....)<br>312 | Faculty Signature |       |
|                   | Qn.                 | a                        | b                               | c                            |                                      |                   | Total |
|                   | 1                   | 5                        |                                 |                              |                                      |                   | 5     |
| 2                 | 64                  | 5                        | 5                               | 91                           | 262                                  |                   |       |

- 1) a) ✓ 17 26L
- i) c) ✓
- ii) MOV CX, 1234H ✓
- iii) B) ✓
- iv) maximum +
- v) B) ✓
- vi) PC<sub>6</sub> (1<sub>00</sub> X<sub>0</sub> X<sub>0</sub> X<sub>0</sub>) ✓
- vii) B) ✗ mode mode
- viii) B) ✗
- 2) a)
- i) D) ✓
- ii) Protected mode ✓
- iii) A) (If it uses 8 high performance pins ✓  
 $8 \times 2 + 3 = 24$ )
- iv) B) ✓
- v) C) ✓
- vi) 8-Arduino, 32 / 64 - Raspberry (Pi 6 uses 64)
- vii) C) ✗ ✓

2) b)

### i) Pentium processor.



#### \* Code & Data cache:

This is the functional component which stores recently accessed data using LRU algorithm for faster accesses of data.

\* Prefetch buffer:

This buffer prefetches the instruction using the

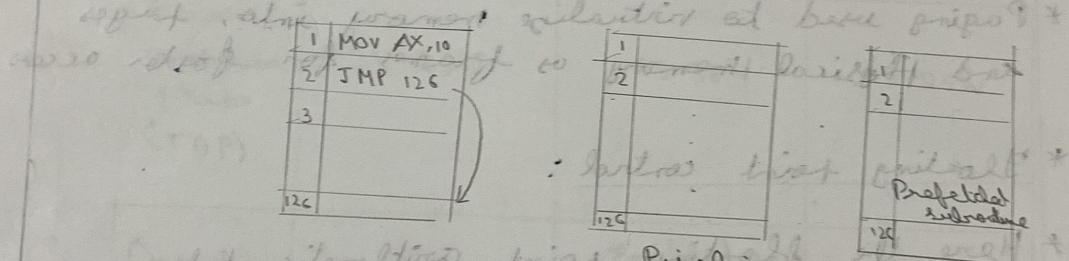
branch  
c. Head  
access

\* Branch  
code  
This  
just  
it to

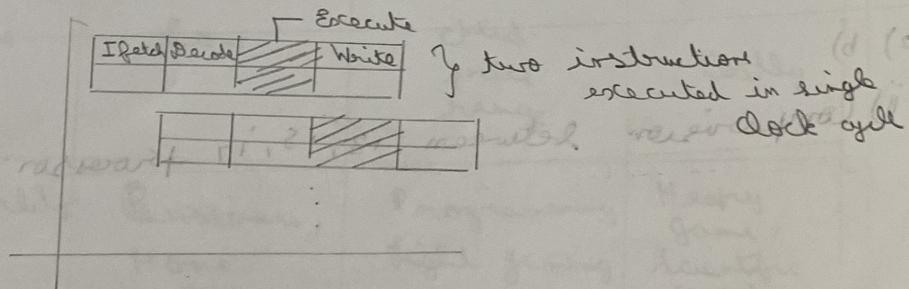
\* Super  
U li  
V li  
inst

branch prediction logic and uses a TLB  
(Translation Lookaside Buffer) for faster  
access of instruction

- \* Branch prediction logic:
- \* This branch prediction logic prefetches the jmp and other branch statements and provides it to the prefetch buffer.



- \* Superscaled Architecture:
- \* U line - all integer and floating point computations  
V line - simple integer and some floating point instruction.



- \* This is superscaled architecture where two instructions gets executed in a single clock cycle.
 

```
MOV AX, 1000
MOV ES, 2000
```

} independent instruction
- \* If there is a MNX instruction, 3 instructions gets executed in a single clock cycle.
- \* Paging:
- \* Paging used to virtualize memory into pages and physical memory as frames for faster access
- \* Floating point control:
  - \* Here the floating point arithmetic takes place using
    - Adder - Adding floating point
    - Multifier - Multiplying floating point
    - Divide - Dividing floating point
  - \* These are the changes in Pentium to improve its performance compared to its predecessor.

2) b)

ii) Comparison between i3, i5, i7 processor.

| Hardware features       | i3                                  | i5                             | i7                               |
|-------------------------|-------------------------------------|--------------------------------|----------------------------------|
| Cores                   | 2-4                                 | 4-6                            | 6-8                              |
| Threads                 | 4-8                                 | 8-12                           | 12-16                            |
| Cache size              | 3-8 Mb                              | 6-12 Mb                        | 12-25 Mb                         |
| Power consumption (TDP) | 35-65W                              | 65-95W                         | 95-125W                          |
| Overclocking            | Not enabled                         | Enabled in latest generations. | Enabled                          |
| Hyper Threading         | Not enabled.<br>(Enabled zone-line) | Enabled in latest generations. | Enabled                          |
| Price                   | Low                                 | Mid-price range                | Costly                           |
| Usability               | Business, Home use                  | Programming, Light gaming      | Heavy game, scientific computing |

## Software features :

i3:

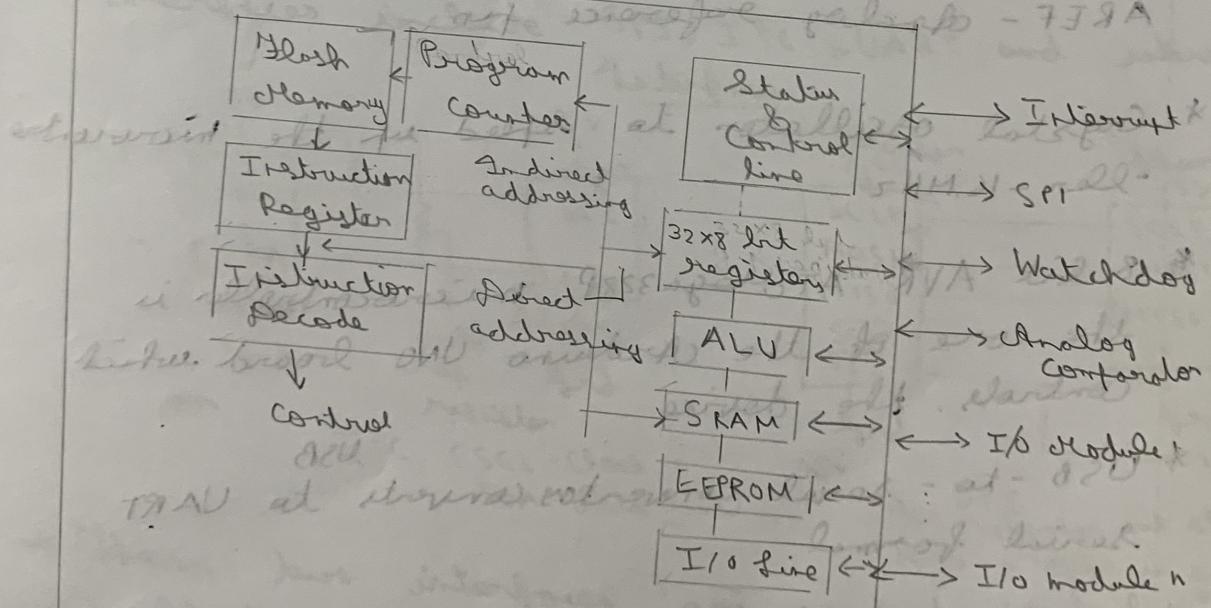
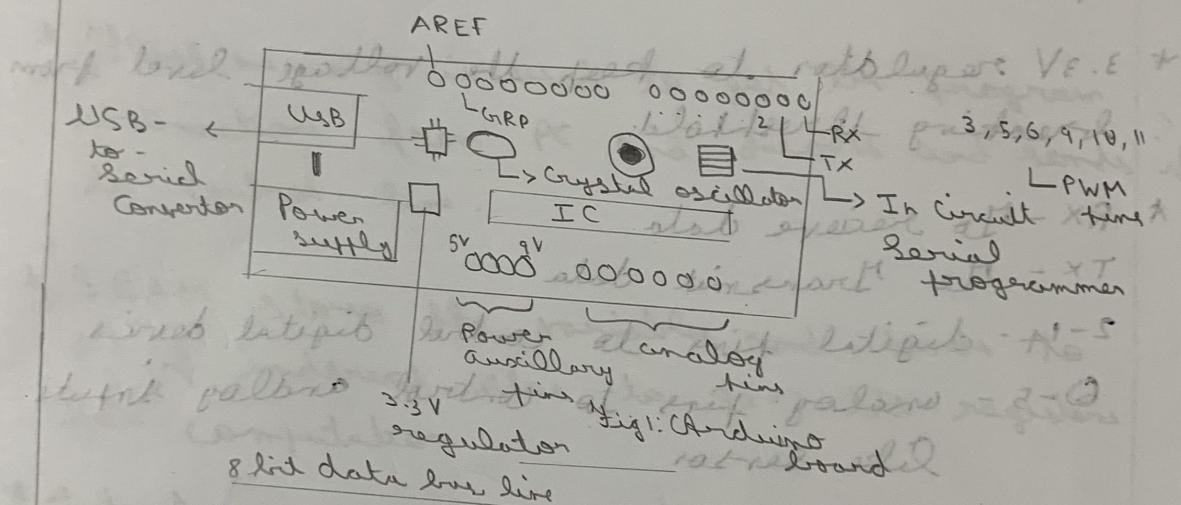
- \* i3 is built on Skylake architecture so, it ~~is~~ does not support hyperthreading as the cores are not turned ~~into~~ <sup>overhead</sup> virtual cores.
- \* Turbo boost is ~~not~~ enabled. Uses real address and protect mode.
- \* i3 uses Kaby architecture in its initial generations, Coffee lake architecture in 10th generation and its successors and Comet lake, Alder and Prairie architecture in its recent generations.
- \* So, 8 efficiency and 6 high-performance cores were introduced and hyperthreading were used  $\Rightarrow 6 \times 2 + 8 = 20$  threads.
- \* Turbo boost ranges from 2.4 to 3.9 GHz

i7:

- \* i7 uses Skylake architecture and its the fastest processor by intel with 20+ threads and supports SMP instructions.

\* The three are based on CISC architecture but the software features like addressing mode, tagging and segmentation are based on RISC.

2) c) i) Architecture of Arduino Uno:

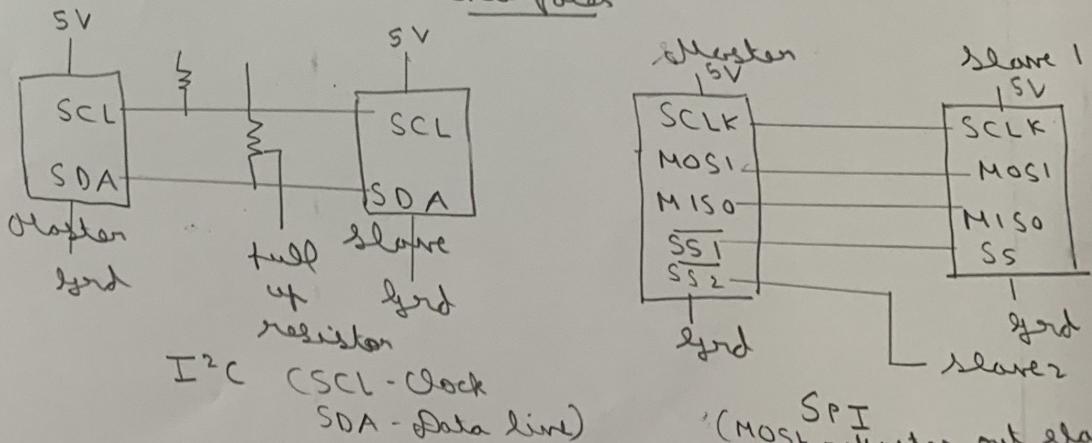


## Features of Arduino Board:

- \* USB port for connecting with external devices like keyboard etc.
- \* 7-12 V power supply and 5V is standard. This is sent using power and auxiliary pins.
- \* 3.3V regulator to keep the voltage level from breaking threshold.
- \* RX - To receive data
- \* TX - To transmit data
- \* 2-14 - digital pins to control digital device
- \* 0-5 - analog pins to control analog inputs like sensor
- \* AREF - Analog reference pin
- \* Crystal oscillator to speed up the microcontroller - It is - 16 MHz
- \* 8 bit AVR ATmega328P microcontroller is the core of the Arduino Uno board which controls the device.
- \* USB - to - serial converter converts <sup>USB</sup> serial format to UART
- \* ICSP Header can start the arduino board without the bootloader (start - programmed)

## Working (Harvard architecture) & Interfaces;

- \* Flash ROM - 32 KB to contain the program
- \* SRAM - 2 KB to store the variables
- \* EEPROM - 1 KB to contain the essential info of ordinary board.
- \* Flash memory is used to get the program instructions from PC and decodes and sends it to control line.
- \* SRAM stores the variables and sends to PC if indirect else to 32x8 bit registers for computations.
- \* Interfaces include SPI, I<sup>2</sup>C, UART and interrupt



- \* These two interfaces are used to control multiple devices at the same time with external peripheral devices.