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M/T/W/T/F/S/S

ASSIGNMENT-4

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1. The various members of the 8051 family based on their ROM are:

- a) 8031 - No ROM
- b) 80xx - Mask ROM
- c) 87xx - EEPROM
- d) 89xx - Flash EEPROM (Eg. AT89C51, AT89S51)

8031: Intel 8031 and 80C31 are members of MCS-51 family of 8-bit microprocessors. Microcontrollers 8031 / 80C31 have the same integrated peripherals as 8051 MCUs - 4 I/O ports, two 16-bit timers / counters, on-chip oscillator and a serial port. The MCUs have 128 bytes of internal RAM, and, in addition to that can utilize up to 8x1 kB of external data memory.

Important Notes:



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The micro-controllers don't have on-chip RAM and must use external program memory.

8051: It has 128 bytes of RAM, 4KB of on-chip ROM, two 16 bit timers / counters, one serial port, six interrupt sources, 8 bit ALU and 4 ports of 8 bit each. It has a Harvard Memory Architecture i.e. it has 16 bit Address bus (Each of 9 bits & 10 bits) and 8 bit data bus.

8052: This microcontroller has 256 bytes of RAM and 3 timers. In addⁿ to the standard features of 8051, the microcontroller has an added 128 bytes of RAM and a timer. It has one serial port & 6 interrupt sources.

8751: This microcontroller is the UV-EPROM version of 8051. This chip has only 4K bytes of UV-EPROM. Important Notes: It is required to have access to the ROM burner & the UV-EPROM eraser to erase

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the contents of the chip before its programmed again.

AT89C51: It's an 8-bit micro-controller from the Intel family. It's the flash Rom version of 8051. It's a 40 pin IC package with 4 kB flash memory. It has four ports and they altogether provide 32 programmable GPIO pins.

AT 89552: It's an 8-bit CMOS microcontroller from 8051 family of Intel microcontrollers. It has 8 kB flash memory & 256 bytes of RAM. It has 32 I/O pins comprising of three 16-bit timers, external interrupt, full-duplex serial port, on-chip oscillator & clock circuitry.

The comparison chart of 8051 family members is as follows:

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	ROM	RAM	Timer	2nd Source	I/O Pin	Other
8051 family						
8031	0K	128	2	6	32	-
8051	4K	128	2	6	32	-
8052	8K	256	3	8	32	-
8953	12K	256	3	9	32	WD
8955	20K	256	3	8	32	WD
898252	8K	256	3	9	32	ISP
891051	1K	64	1	3	16	AC
89051	2K	128	2	6	16	AC

WD = Watch Dog Timer

AC = Analog Comparison

ISP = In System Programming

Important Notes: _____

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2	39
3	38
4	37
5	36
6	35
7	34
8	33
9	32
10	
	31
11	30
12	29
13	28
14	27
15	26
16	25
17	24
18	23
19	22

Pin Diagram of 8051 Microcontroller

The pin descriptions are as follows:

- Pin 1-8 (Port 1): Pins 1 to 8 are PORT 1 pins of 8051. Port 1 pins are consisting of 8 bit bidirectional input / output pins which with internal pull up resistors.
- Pin 9 (RST): Active high pin, ie if the pin is high for a duration of two machine cycles, the microcontroller will be reset, i.e., all pins are set to 0000, SP is set to 0007 & the RAM content becomes 0.

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Port 3 Pin	Function	Description
P 3.0	RxD	Serial input
P 3.1	TxD	Serial output
P 3.2	INT0	External interrupt 0
P 3.3	INT1	External interrupt 1
P 3.4	TO	Timer 0
P 3.5	T1	Timer 1
P 3.6	WR	External memory write
P 3.7	WRD	External memory read

Pins 18 & 19: Pins 18 and 19 are XTA1L2 and XTA1, i.e., the pins for connecting external oscillator using a quartz crystal oscillator or a TTL oscillator.

Pin 20 (GND): Pin 20 is the ground pin of 8051 microcontroller. It represents OV and is connected to the negative terminal of power supply.

Important Notes:

power supply

Pins 21-28 (Port A): 7-bit bidirectional port, i.e., all the pins 2 pins act as I/O or O/P.

Additionally, when Port ROM is interfaced, Port 2 pins act as the higher order address bytes. Port 2 pins have internal pull-ups.

Pin 29 (PSEN): Pin 29 is the program store enable pin (PSEN). It operates on active low signal. By this pin, external program memory can be read. It is generally connected to the OE pin of the ROM.

Pin 30 (ALE / PH0S): Pin 30 is the address latch enable pin. It operates on

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Pin 31 (EA / RPP): Pin 31 is External Action Enable pin, it allows external program memory. Code from the external program memory can be fetched only if this pin is low. For normal operation, this pin is pulled HIGH.

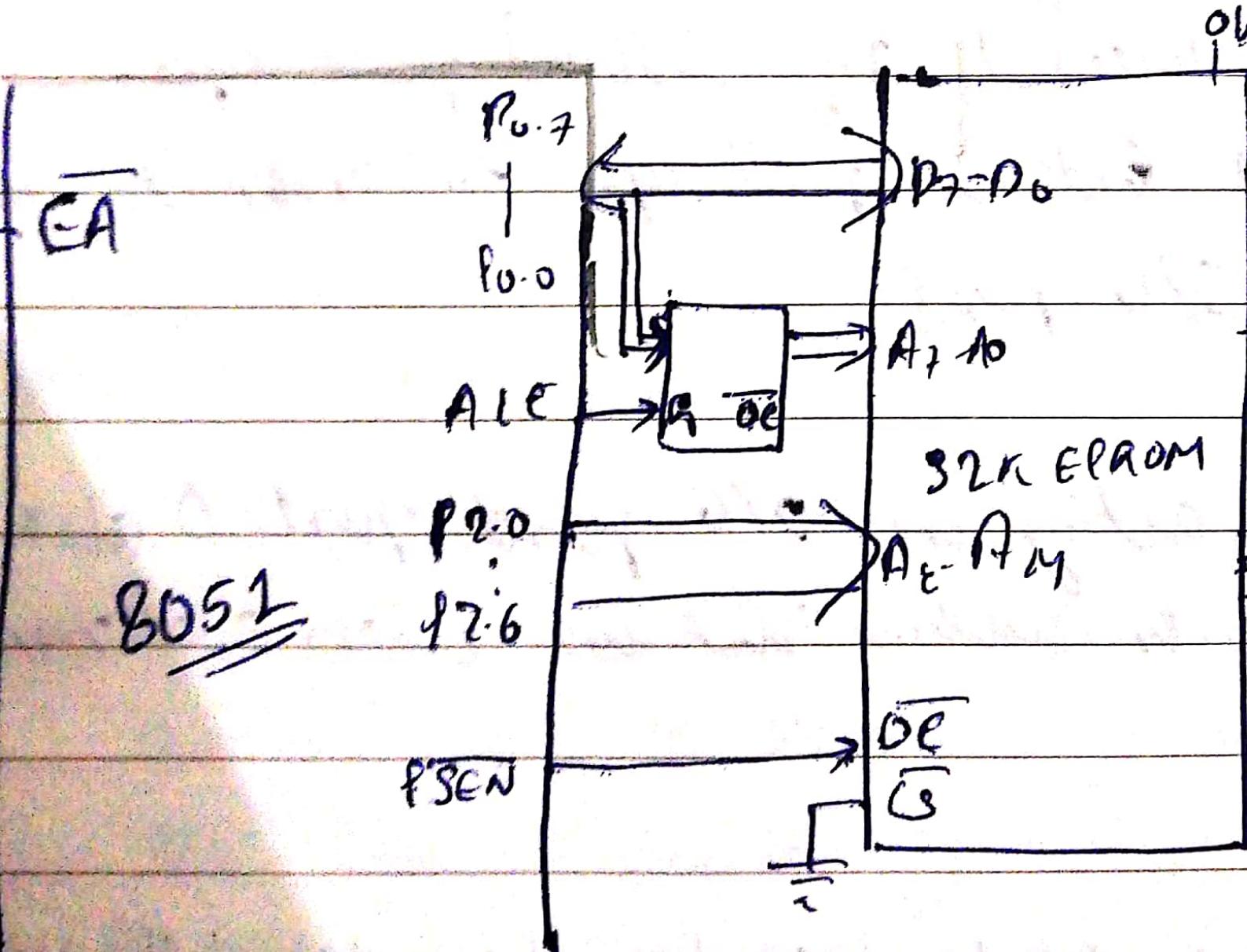
pins 32-39 (Port 0): Pins 32-39 are port 0 pins. They are also bidirectional I/O pins but without any internal pull-ups. Hence, we need external pull-ups in order to use port 0 pin as I/O port.

In addition to acting as I/O port, Port 0 also acts as lower order address / data bus when ext. memory is needed.

Pin 40 (Vcc): Power supply pin to with the +5V voltage

Important Notes: Is often

\overline{PSEN} is connected to \overline{OE} of 8051
 \overline{EA} is low to enable external CH



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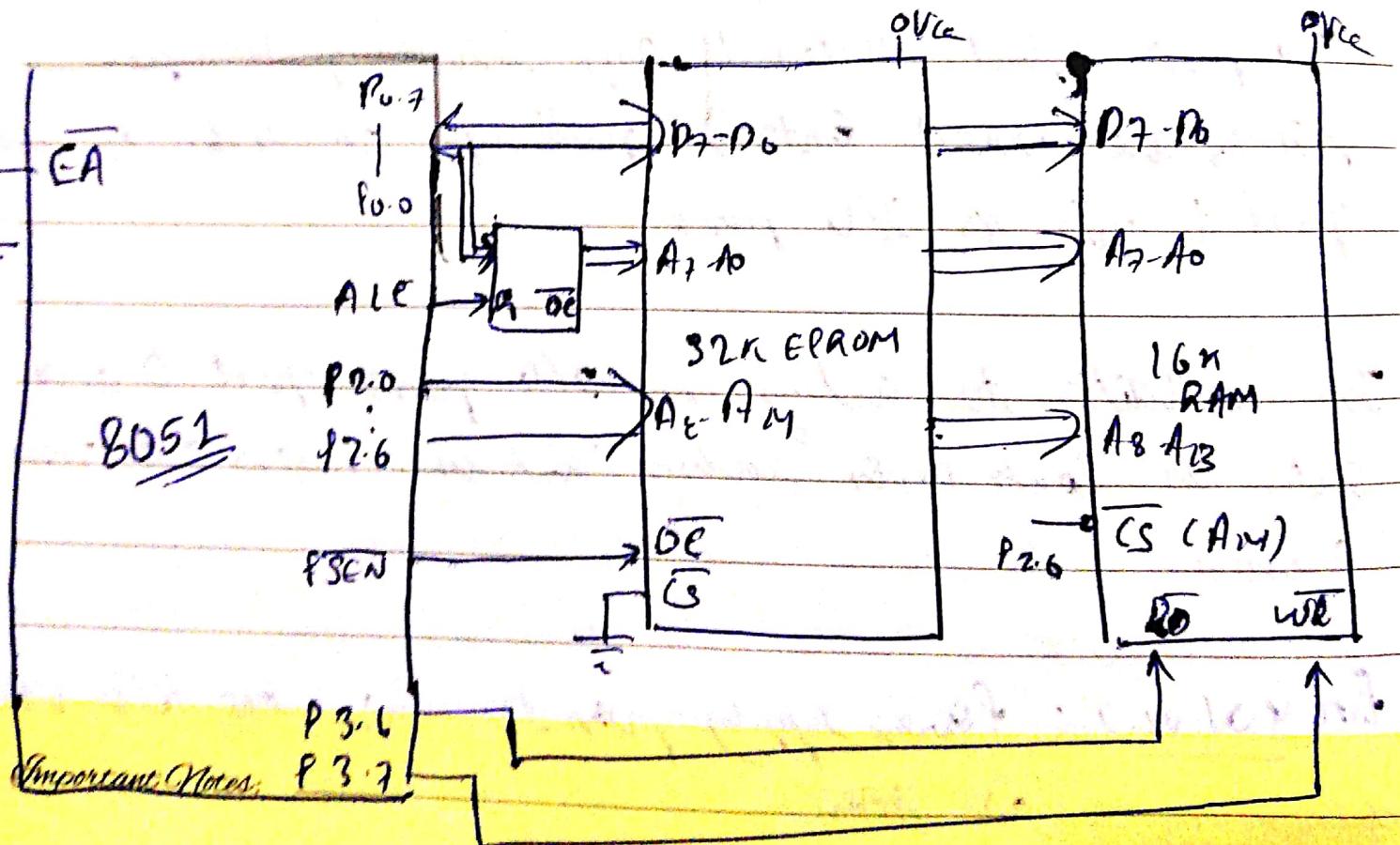
3.

Given EPROM = 32K = $2^{10} \times 2^5 = 2^15 = 15$ address lines
RAM: 16K = $2^{10} \times 2^4 = 2^{14} = 14$ address lines

Port 0 is used as multiplexed data & address line.
WR & RD of RAM are connected to P3.6 & P3.7
of 8051.

PSEN is connected to OE of the EPROM

EA is low to enable external EPROM & RAM





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P1.0	1	U0 - Vcc
P1.1	2	39 - P0.0 (AD0)
P1.2	3	38 - P0.1 (AD1)
P1.3	4	37 - P0.2 (AD2)
P1.4	5	36 - P0.3 (AD3)
P1.5	6	35 - P0.4 (AD4)
P1.6	7	34 - P0.5 (AD5)
P1.7	8	33 - P0.6 (AD6)
RST	9	32 - P0.7 (AD7)
(XIN) P3.0	10	31 - EA1/VPP
(XIN) P3.1	11	30 - ALE/PROG
(INTD) P3.2	12	29 - ESEN
(INTI) P3.3	13	28 - P2.7 (A15)
(TO) P3.7	14	27 - P2.6 (A14)
(T1) P3.5	15	26 - P2.5 (A13)
P3.6	16	25 - P2.4 (A12)
(WR) (RD) P3.2	17	24 - P2.3 (A11)
X7AL2	18	23 - P2.2 (A10)
X7AL1	19	22 - P2.1 (A9)
GND	20	21 - P2.0 (A8)

Important Notes: