Unit 5

LECTURE 1
Peripheral Interfacing

PIN DIAGRAM

	8255A	
PA3 ☐ 1		40 ☐ PA4
PA2 ☐ 2		39 ☐ PA5
PA1 ☐ 3		38 ☐ PA6
PA0 ☐ 4		37 ☐ PA7
$\overline{RD}$ ☐ 5		36 ☐ $\overline{WR}$
$\overline{CS}$ ☐ 6		35 ☐ RESET
GND ☐ 7		34 ☐ D0
A1 ☐ 8		33 ☐ D1
A0 ☐ 9		32 ☐ D2
PC7 ☐ 10		31 ☐ D3
PC6 ☐ 11		30 ☐ D4
PC5 ☐ 12		29 ☐ D5
PC4 ☐ 13		28 ☐ D6
PC0 ☐ 14		27 ☐ D7
PC1 ☐ 15		26 ☐ Vcc
PC2 ☐ 16		25 ☐ PB7
PC3 ☐ 17		24 ☐ PB6
PB0 ☐ 18		23 ☐ PB5
PB1 ☐ 19		22 ☐ PB4
PB2 ☐ 20		21 ☐ PB3
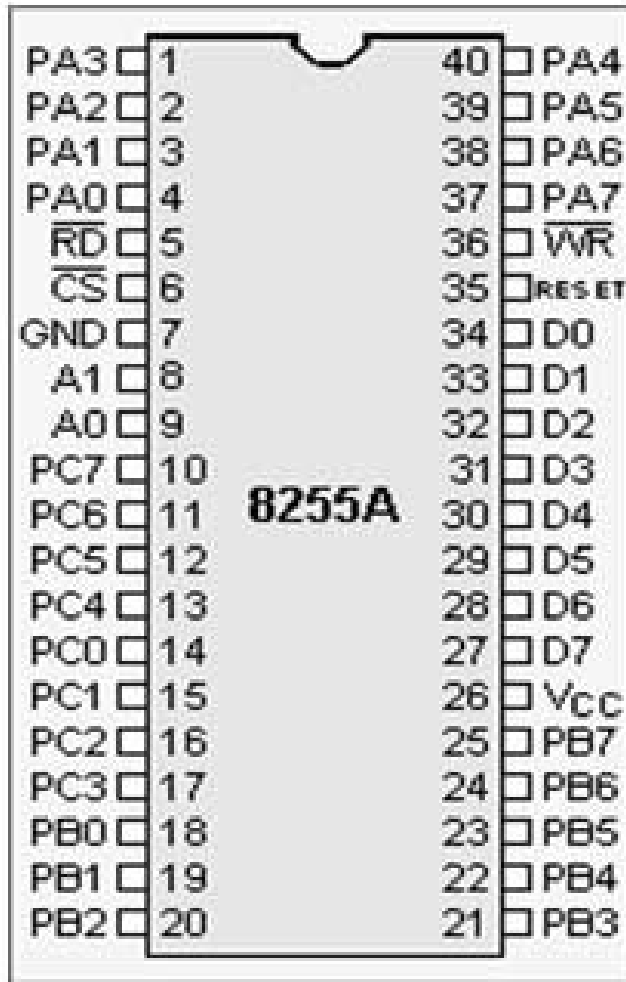
Pin	Description
$D_0 - D_7$	Data lines
RESET	Reset input
$\overline{CS}$	Chip select
$\overline{RD}$	Read control
$\overline{WR}$	Write control
A_0, A_1	Internal address
$PA_7 - PA_0$	Port-A pins
$PB_7 - PB_0$	Port-B pins
$PC_7 - PC_0$	Port-C pins
V_{cc}	+5V
V_{ss}	0V (GND)
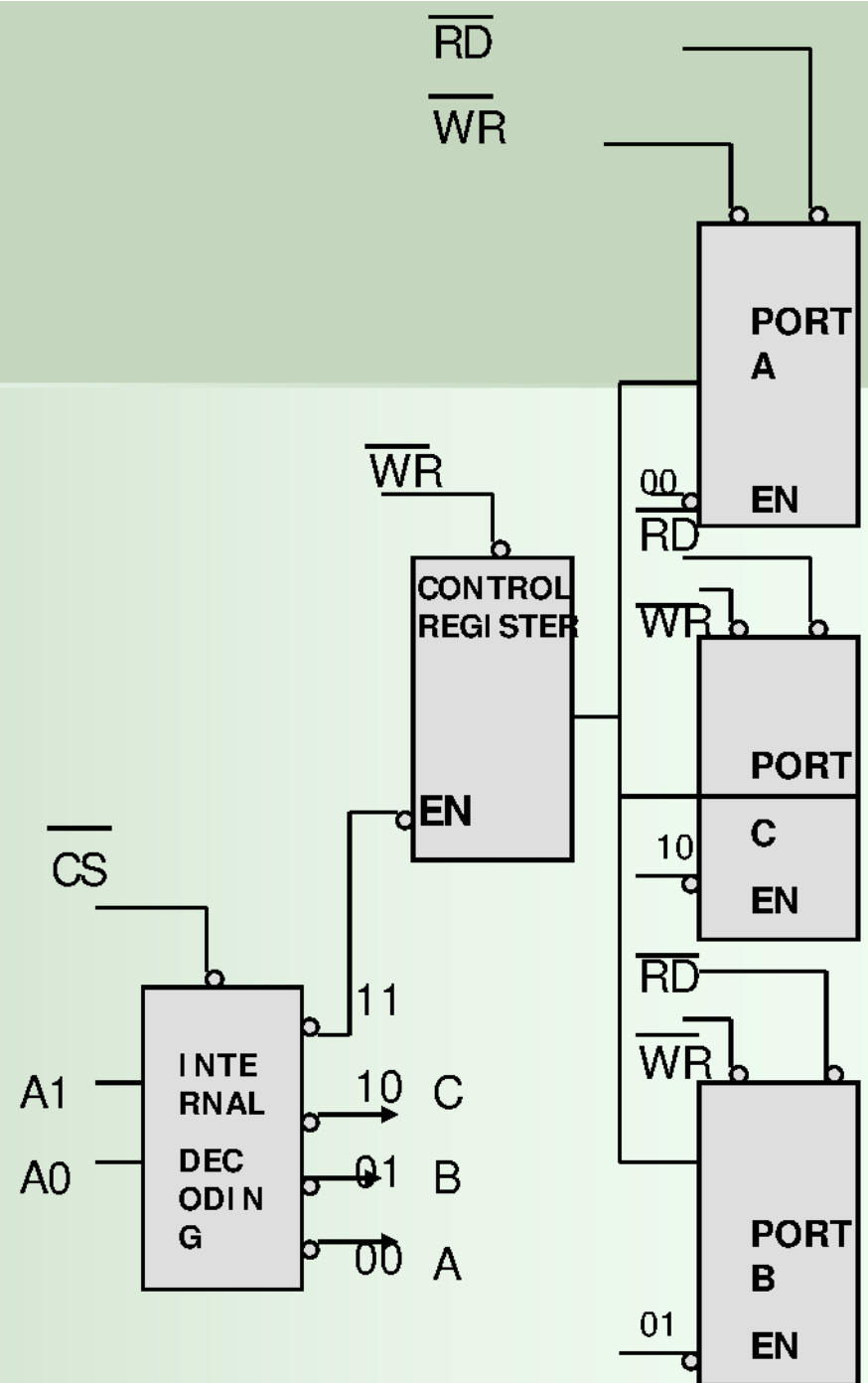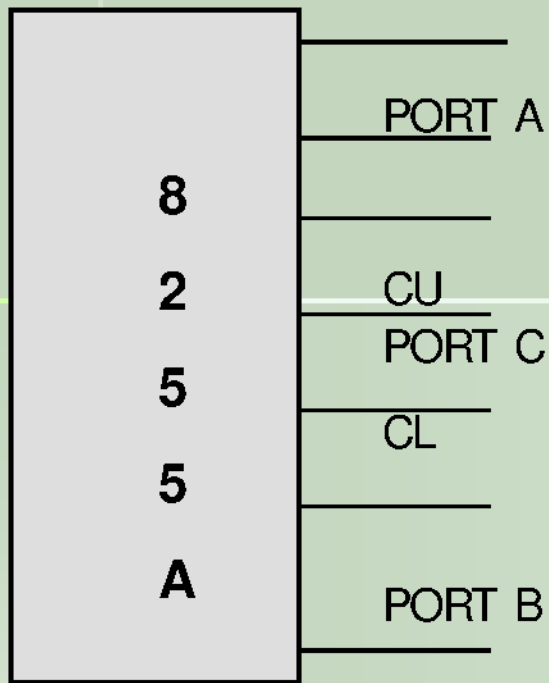
Expanded version of control logic and I/O port

8255A

POWER SUPPLIES

→ +5V

→ GND

GROUP A CONTROL

GROUP A PORT A (8)

I/O PA7-PA0

GROUP A PORT C UPPER (4)

I/O PC7-PC4

BIDIRECTIONAL DATA BUS

D1,D0

DATA BUS BUFFER

8-BIT INTERNAL DATA BUS

GROUP B PORT C LOWER (4)

I/O PC3-PC0

$\overline{RD}$

WR

A1

A0

RESET

READ/ WRITE CONTROL LOGIC

GROUP B CONTROL

GROUP B PORT B (8)

I/O PB7-PB0

1

CS
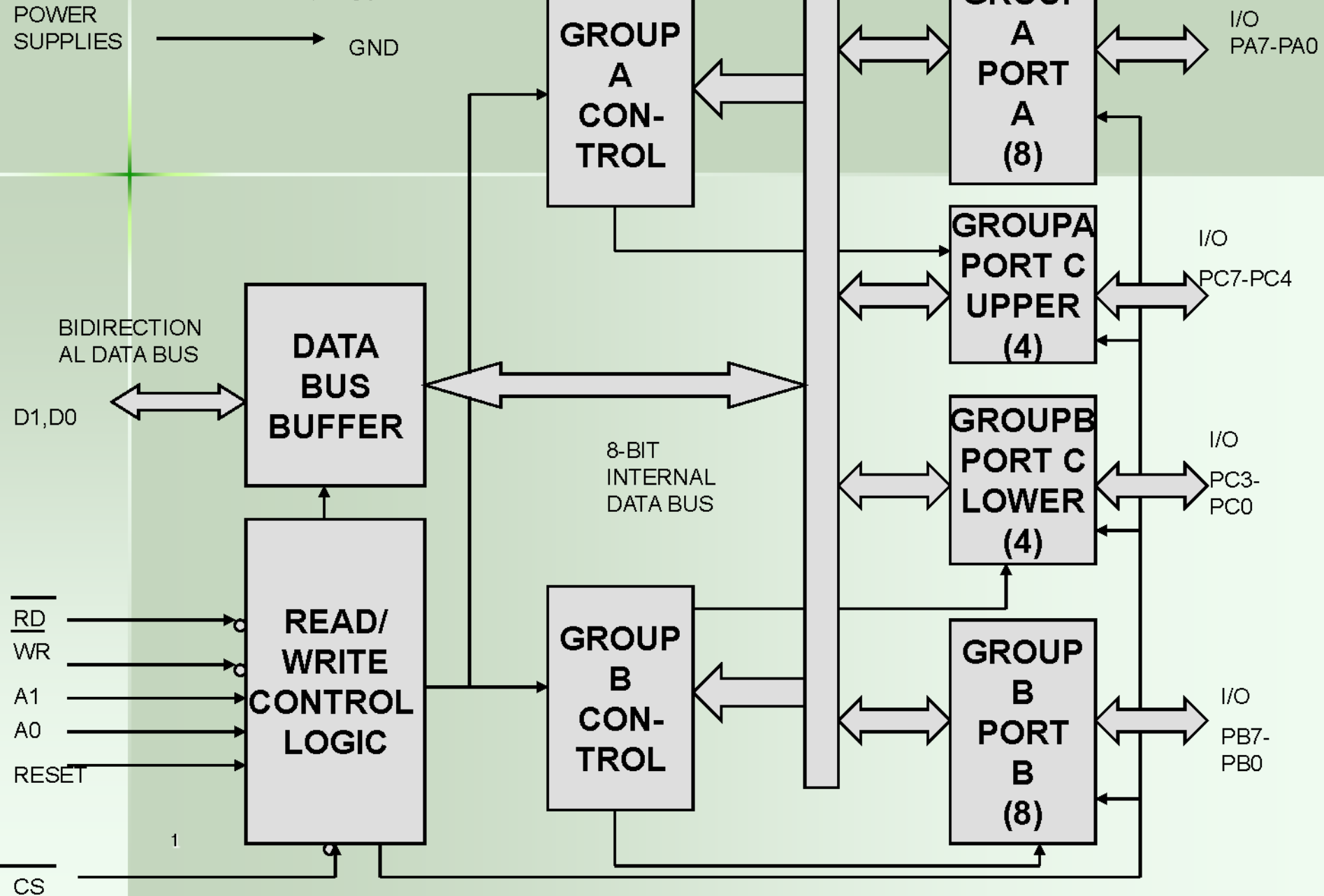
CONTROL WORD

D7 | **D6** **D5** **D4** **D3** **D2** **D1** **D0**

0/1

BSR MODE

BIT SET/RESET

FOR PORT C

NO EFFECT ON I/O

 MODE

I/O MODE

MODE 0

SIMPLE I/O FOR PORTS

A, B AND C

———————

MODE 1

HANDSHAKE I/O FOR PORTS A AND/OR B

PORT C BITS ARE USED FOR HANDSHAKE

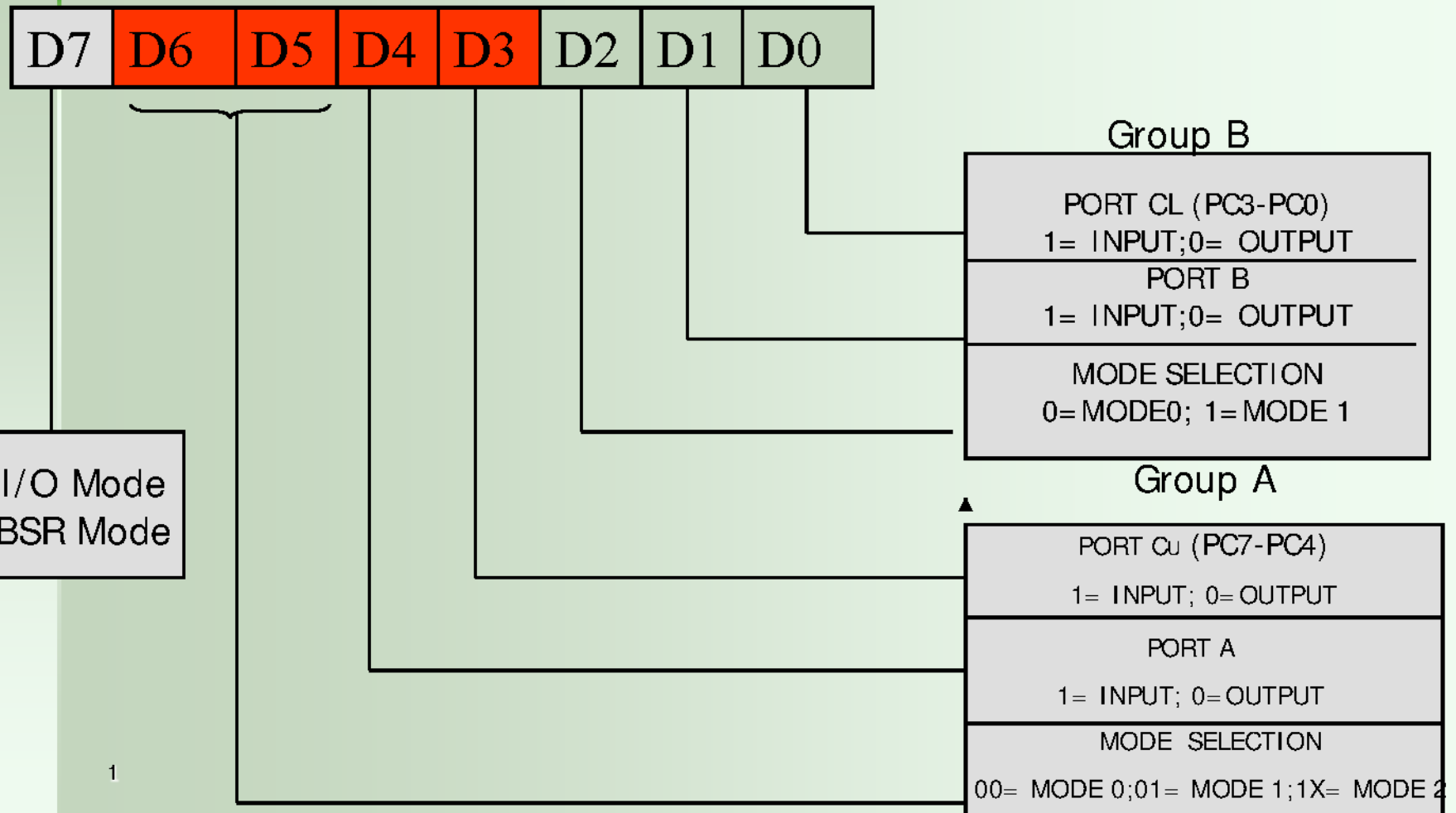**MODE 2**
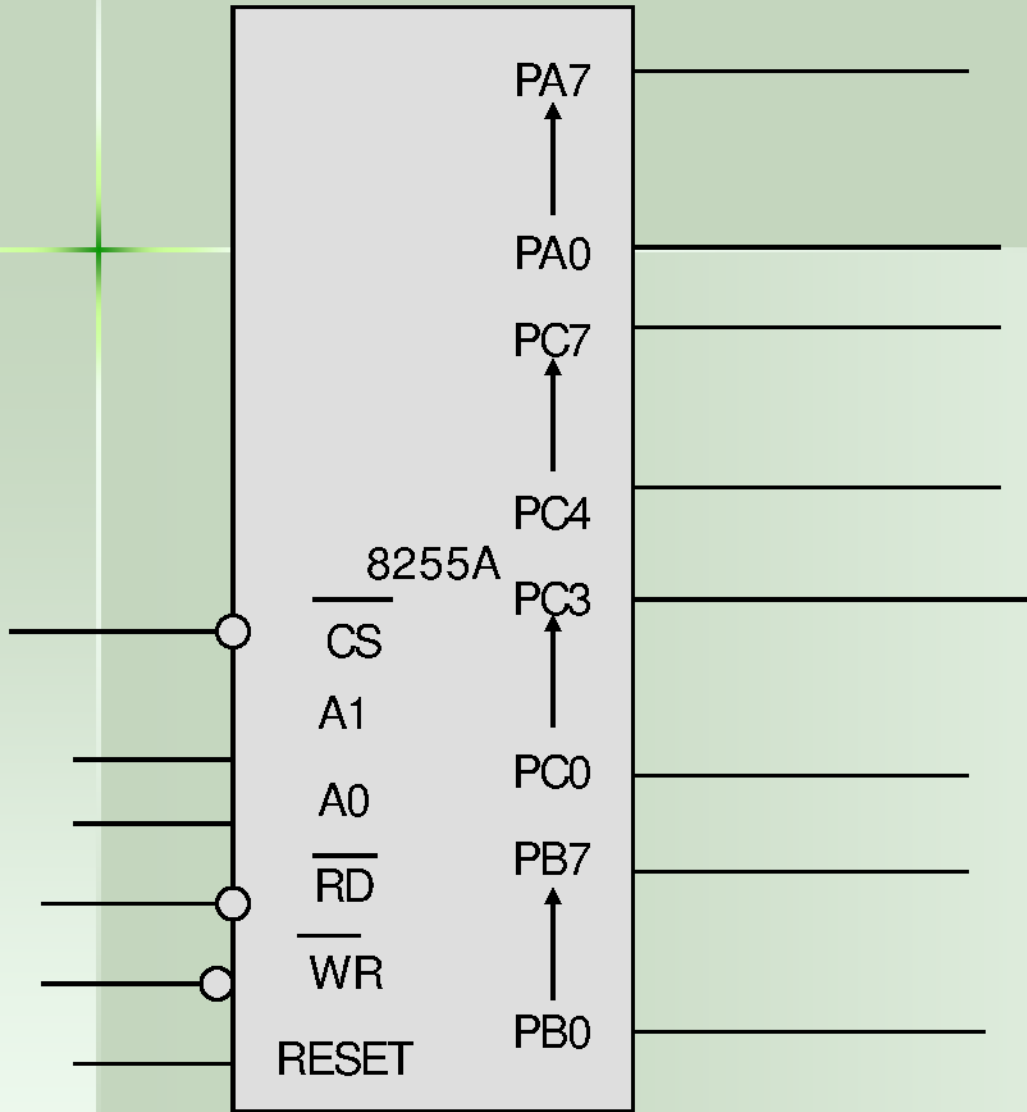
BIDIRECTIONAL DATA BUS FOR PORT A

PORT B EITHER IN MODE 0 OR 1

PORT C BITS ARE USED FOR HANDSHAKE

Control Word Format for I/O Mode

D7	D6	D5	D4	D3	D2	D1	D0

1= I/O Mode
0= BSR Mode

Group B

PORT CL (PC3-PC0)
1= INPUT;0= OUTPUT

PORT B
1= INPUT;0= OUTPUT

MODE SELECTION
0= MODE0; 1= MODE 1

Group A

PORT Cu (PC7-PC4)
1= INPUT; 0=OUTPUT

PORT A
1= INPUT; 0=OUTPUT

MODE SELECTION
00= MODE 0;01= MODE 1;1X= MODE 2

1

8255A

PA7

PA0

PC7

PC4

PC3

PC0

PB7

PB0

$\overline{CS}$

A1

A0

$\overline{RD}$
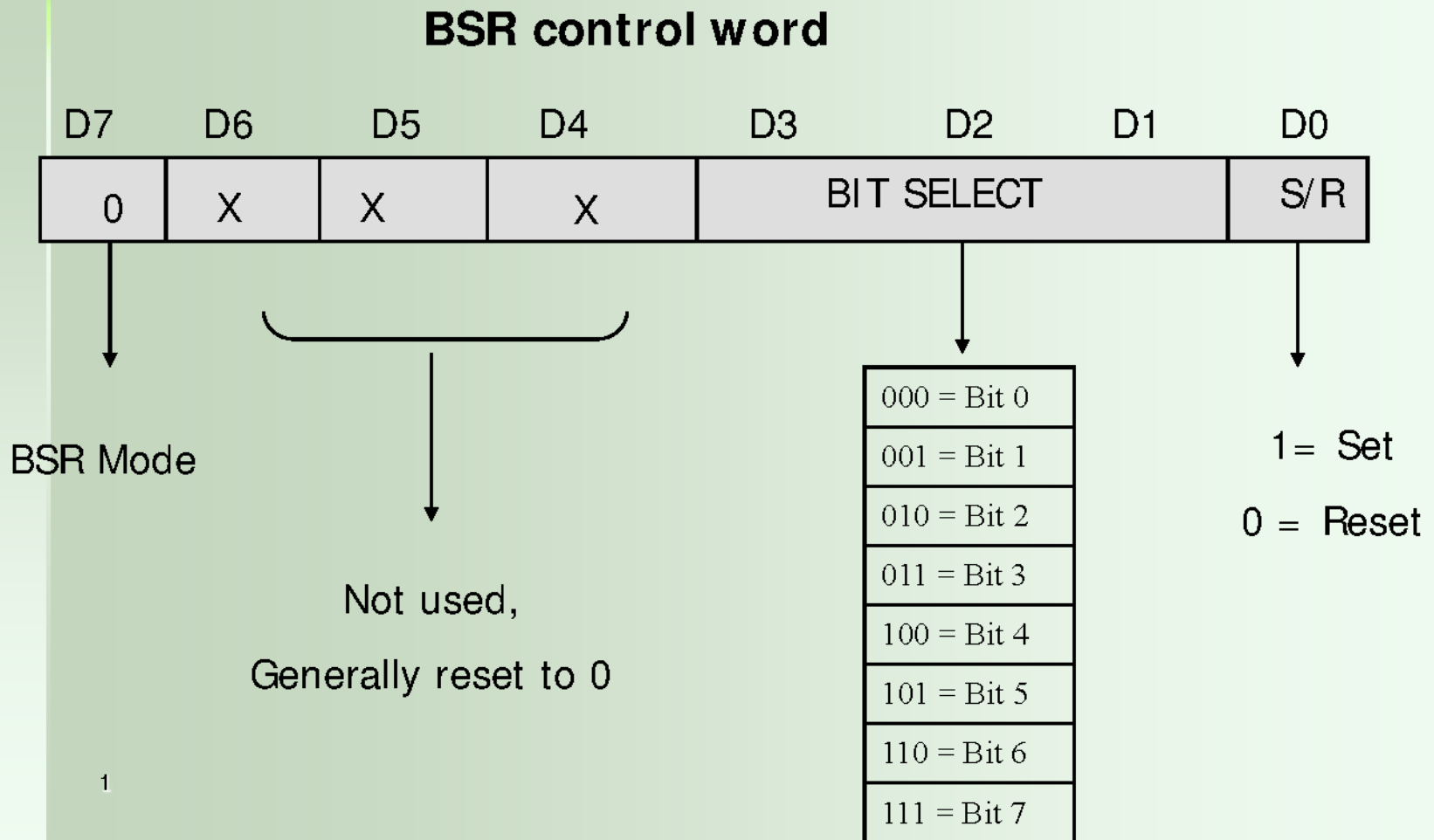
$\overline{WR}$

RESET

1

Mode 0 (Simple Input or Output)

PROBLEM 1)

- Interface 8255a to a 8085 microprocessor using I/O-mapped - I/O technique so that Port a have address 80H in the system.

- Determine addresses of Ports B,C and control register.

- Write an ALP to configure port A and port C_L as output ports and port B and port C_U as input ports in mode 0.

- Connect DIP switches connected to the to input ports and LEDs to the output ports .

- Read switch positions connected to port A and turn on the respective LEDs of port b. Read switch positions of port C_L and display the reading at port C_U
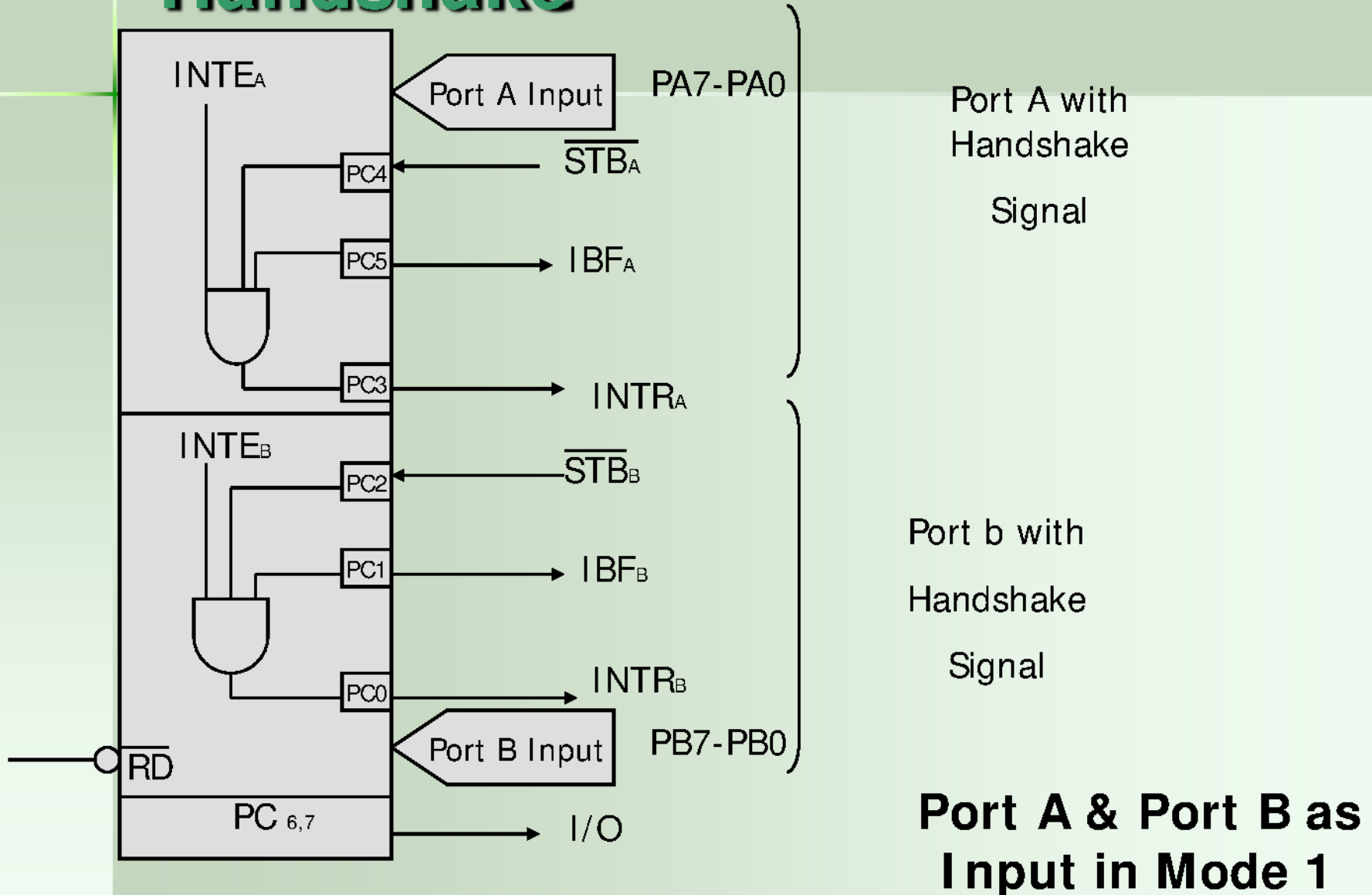
1

BSR (Bit Set/Reset) Mode

BSR control word

D7	D6	D5	D4	D3	D2	D1	D0
0	X	X	X	BIT SELECT			S/R

BSR Mode

Not used,

Generally reset to 0

000 = Bit 0
001 = Bit 1
010 = Bit 2
011 = Bit 3
100 = Bit 4
101 = Bit 5
110 = Bit 6
111 = Bit 7

1= Set

0 = Reset

1

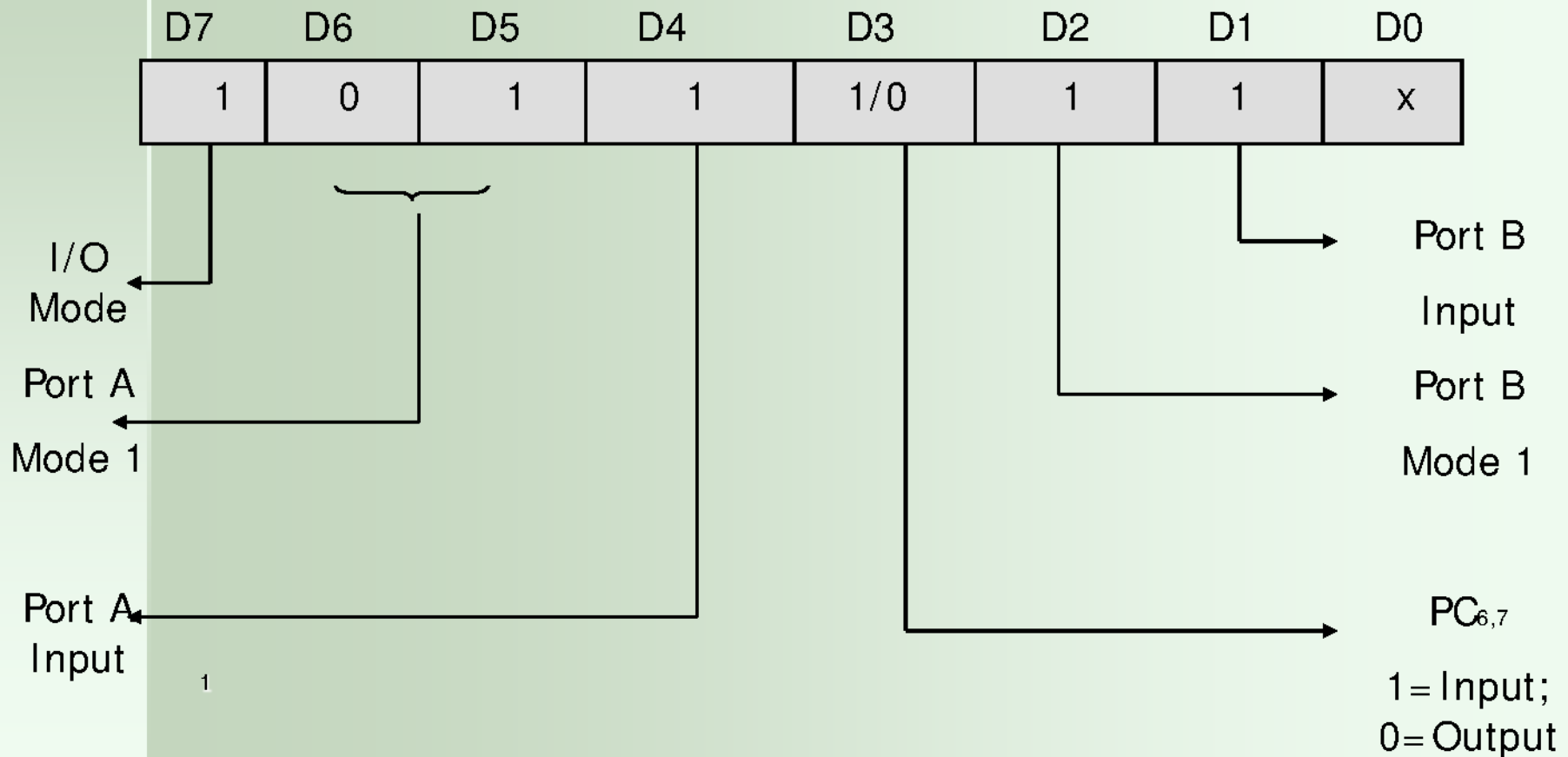# Problem 2)

- Write an ALP to set bits PC7 and PC 3 and reset them after 10 ms in BSR mode.

Mode 1: Input or Output with Handshake

INTE_A

Port A Input   PA7-PA0

PC4 ← $\overline{STB_A}$

PC5 → IBF_A

PC3 → INTR_A

INTE_B

PC2 ← $\overline{STB_B}$

PC1 → IBF_B

PC0 → INTR_B

Port B Input   PB7-PB0

$\overline{RD}$

PC 6,7 → I/O

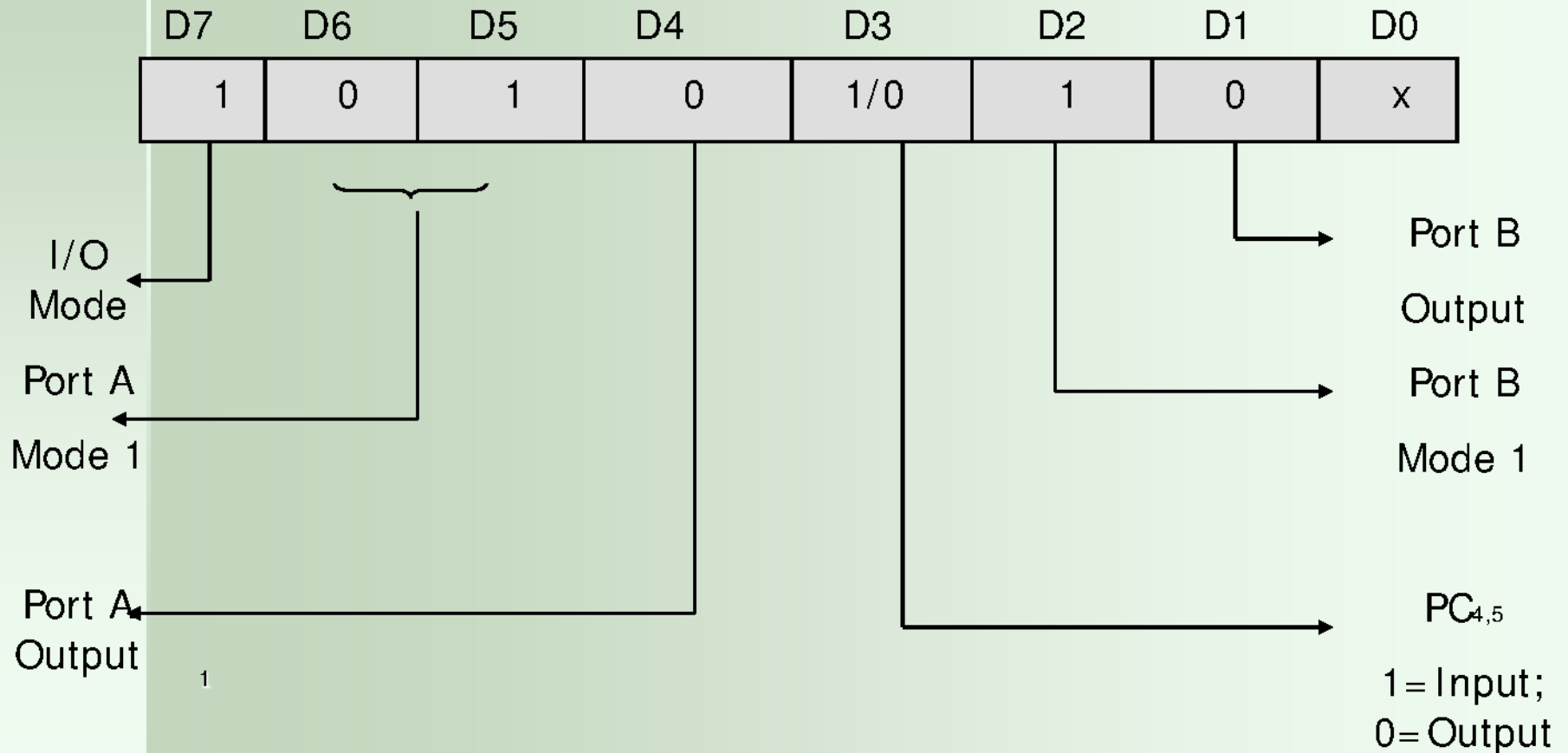Port A with Handshake

Signal

Port b with

Handshake

Signal

Port A & Port B as Input in Mode 1

Control word – mode 1 input

D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	1	1/0	1	1	x

I/O
Mode

Port A

Mode 1

Port A
Input

Port B

Input

Port B

Mode 1

$PC_{6,7}$

1 = Input;
0 = Output

Status Word – Mode 1 input

D7	D6	D5	D4	D3	D2	D1	D0
I/O	I/O	IBF_A	$INTE_A$	$INTR_A$	$INTE_B$	IBF_B	$INTR_B$

$\overline{STB}$

IBF

INTR

$\overline{RD}$

Input from
peripheral

INTE_A

Port A Output ▷ PA7-PA0

Port A with Handshake

Signal

PC7 → $\overline{OBF}_A$

PC6 ← $\overline{ACK}_A$

PC3 → INTR_A

INTE_B

PC2 → $\overline{OBF}_B$

Port b with

PC1 ← $\overline{ACK}_B$

Handshake

PC0 → INTR_B

Signal

Port B Output PB7-PB0

$\overline{WR}$

PC 4,5

I/O

Port A & B as Output

I n Mode 1

1

Control word – mode 1 Output

D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	0	1/0	1	0	x

I/O Mode

Port A Mode 1

Port A Output

Port B Output

Port B Mode 1

$PC_{4,5}$

1 = Input;
0 = Output

Status Word – Mode 1 Output

D7	D6	D5	D4	D3	D2	D1	D0
$\overline{OBF}_A$	$INTE_a$	I/O	I/O	$INTR_A$	$INTE_B$	$\overline{OBF}_B$	$INTR_B$

$\overline{WR}$

$\overline{OBF}$

INTR

$\overline{ACK}$
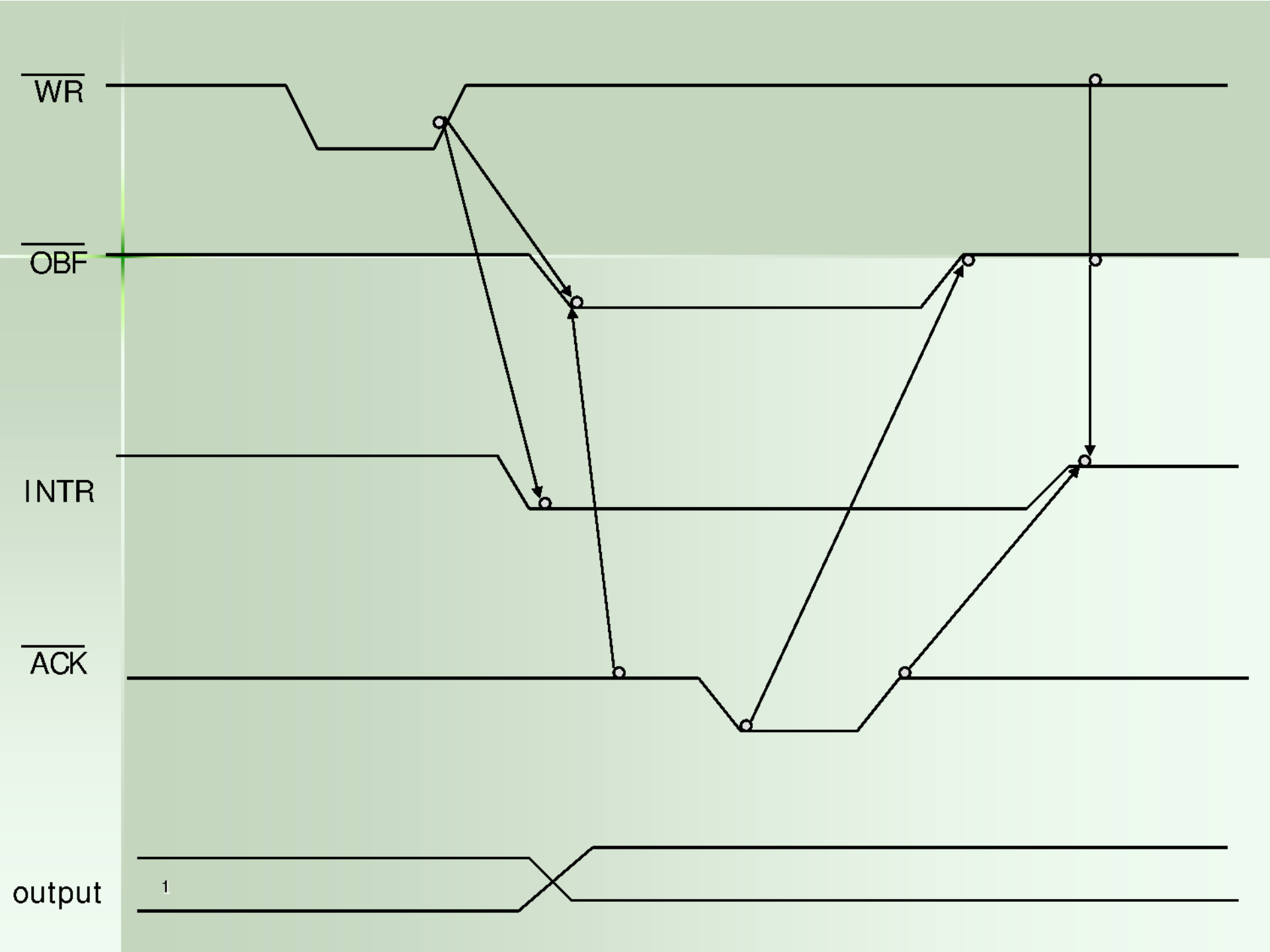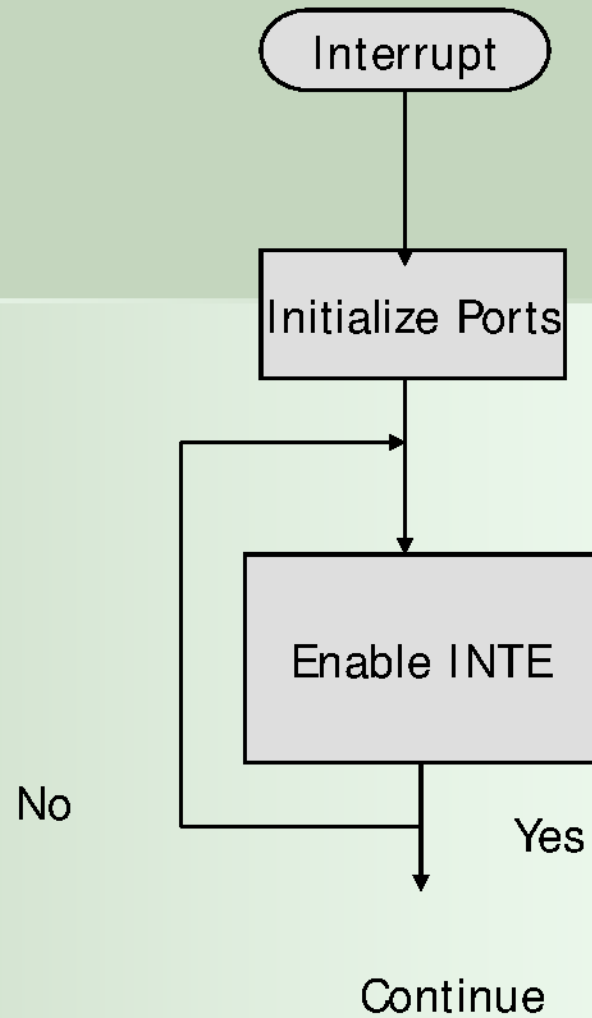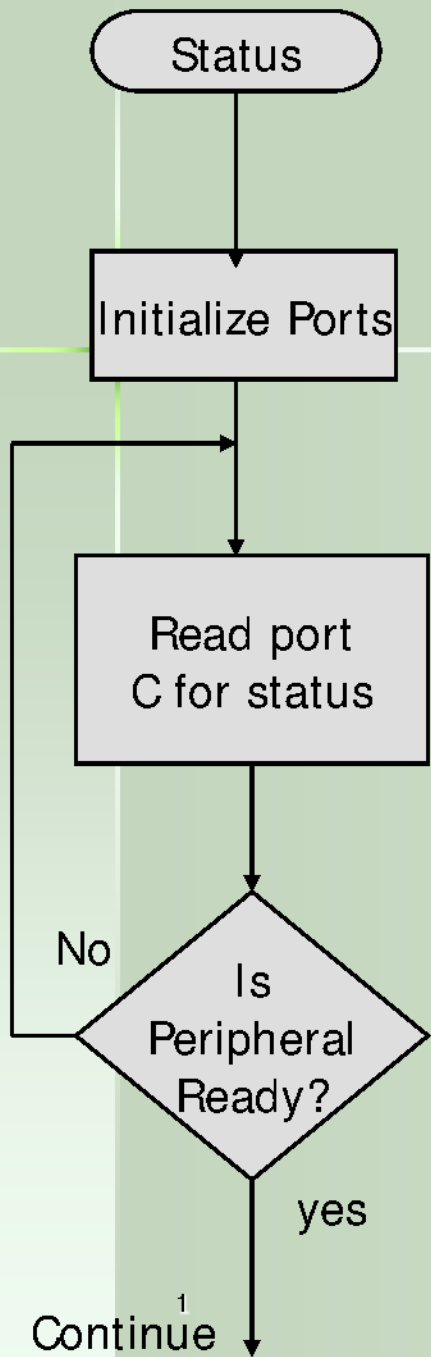
output

Problem 3)

- Initialize 8255A in mode 1 to configure Port A as an input port and Port B as an output port.

- Assuming that an A-to-d converter is connected with port A as an interrupt I/O and a printer is connected with port B as a status check I/O